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A Lecture
ON THE
CONDITIONS WHICH GOVERN THE GROWTH OF THE BACILLUS OF "GAS GANGRENE" IN ARTIFICIAL CULTURE MEDIA.
IN THE BLOOD FLUIDS *IN VITRO*, AND IN THE DEAD AND LIVING ORGANISM.

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MY subject-matter to-day is not, as on previous occasions, the general question of the treatment of infected wounds. It is a much narrower issue. I would propose to consider with you the conditions which respectively promote and inhibit the growth of the "gas gangrene" bacillus of Welch, but here also I shall have in view a purely practical end. The investigation of the conditions which favour or hinder the growth of the organism here in view has, as I see it, only one possible object. That is to conduct sooner or later to the saving of life and limb.

I may, I think, take it as certain that clinical observation is incompetent to furnish us with any precise information regarding the conditions with favour or impede the growth of the bacillus of gas gangrene, and that such information can be obtained only by laboratory investigation. But that does not mean—and we must never lose sight of this—that we can place unrestricted confidence in inferences based upon laboratory experiments. For in laboratory experiments we make for ourselves artificially simplified conditions; and confine our attention to a very limited number of factors. By virtue of this we are subject to make erroneous generalisations, concluding that what holds true under the conditions obtaining in the laboratory experiment will hold true universally. Presumptions of that kind can be avoided only by continually extending and critically revising our laboratory experiments and organising inquiries to find out whether our doctrines really give good results in practice.

And it is specially necessary to take these precautions when therapeutic procedures are based upon laboratory data. For quite a large proportion of such therapeutic procedures rest either upon generalisations which do not apply outside the conditions which are obtained in the experiments, or else upon generalisations which emphasise the thing that is unimportant to the prejudice of the thing that is important. I have in my mind, for example: the doctrine that antiseptics will sterilise an infected wound; and, in connexion with my present subject-matter, the doctrine that the growth of the gas-gangrene bacillus pivots upon the presence or absence of oxygen. It will provide me with a convenient point of departure to invite you to consider what is the experimental basis of this doctrine.

I. CONDITIONS WHICH GOVERN THE GROWTH OF THE BACILLUS OF WELCH IN ARTIFICIAL MEDIA.

To practically all of us the most important scientific datum ascertained with regard to the bacillus of Welch is that it will not grow in the presence of air. And this datum, firmly believed, has dominated all surgical thinking in the domain of gas gangrene. It has led to the employment of oxygen or peroxide of hydrogen injected into the tissues as a sovereign remedy against the progress of gangrene. And it has suggested that the advantage of thoroughly opening up a wound infected by anaerobes is, in the main, advantage derived from letting in the air.

But the thesis upon which all this rests—the thesis that the bacillus of Welch cannot grow and multiply in a presence of air—is as a matter of fact erroneous. It was discovered by Tarozzi that when pieces of animal tissue were added to bouillon cultures of anaerobes could be obtained in open tubes. Ori and Wrzosek, following up this work, showed that the same result could be obtained with pieces of either raw or autoclaved potato, and also with other vegetable tissues. Nor are these, as might be supposed from the fact that we have continued to think along the old lines, very recent discoveries; nor, again, do the aerobic cultures of anaerobes here in question yield only meagre growth. Quite the contrary. The work of Ori and Wrzosek dates back already some ten years. And in reality the cultures of the bacillus of Welch grown in the open in bouillon containing a piece of potato are characterised by very rapid and vigorous growth, with gas production. So vigorous in point of fact is the growth of the bacillus of Welch in the open potato bouillon tube, that this method furnishes, it would seem, the best method for isolating the microbe from specimens of pus in those cases where the organism is present in only very small numbers.

There are displayed before you here a series of open culture tubes implanted with the bacillus of Welch, all showing by their turbidity and by foaming how vigorous is the growth. And, in order that the erroneous mental images which the appellation "anerobes" nurtures in the mind may be obliterated, I have ranged up before you here also cultures in open of a variety of other anaerobes. And let me say that so far we have not obtained any anaerobe from a wound which cannot by proper devices be made to grow freely in open tubes.

You can see that it follows from this, that we cannot possibly promise ourselves that if we introduce oxygen into the tissues, or admit air to the interior of the wound cavity, we shall thereby inevitably arrest a gangrene bacillus infection. Or, putting the conclusion in more general form, we see that the therapeutic principle of combating anaerobes by combating anaerobic conditions cannot be regarded in any sense as an adequate therapeutic principle.

Let us be careful to read the lesson of these tubes aright. All that they teach is that anaerobic microbes can be got to grow with astonishing freedom in culture tubes fully open to the air. But it is not thereby established that the presence of oxygen is either indifferent or congenial to anaerobic microbes. And, in point of fact, it has been suggested, and the view is *a priori* tenable, that the potato may provide some reducing agent which by holding off the oxygen of the air at the outset enables the microbes to get a start, the subsequent growth being due to anaerobic growth in a medium deprived of air by the generation of gas in the culture. This hypothesis that the potato furnishes a reducing substance which gives the culture a start seems to win support from the fact that the potato bouillon gives much less vigorous cultures when stale than when freshly prepared. And, again, the traditional view that oxygen is inimical, or at least uncongenial, to the growth of the class of microbes denoted "anaerobes" does not entirely lack support. When after implanting I empty out the major part of the contents of a potato bouillon tube, reserving only a few c.c.'s, and then lay the tube on its side in the incubator, I get only a very meagre culture. The same holds true when I draw a continuous stream of air bubbles through the culture, and again in the case when cultivating in a capillary tube, I break up my column of fluid by intercalating a number of air bubbles. Moreover, when I endeavour to subculture from the meagre cultures of anaerobes grown under such conditions of maximum exposure to air, I am practically always unsuccessful. But all these considerations do not avail to obscure the fact that we are required to abandon the traditionary view that the growth of anaerobes pivots upon the presence or absence of oxygen. And after taking cognisance of these cultures in open tubes we are intellectually impoverished to the extent that we see that the doctrine of anaerobiotic growth that, as we thought, held unrestrictedly, holds true only with limitations.

Intellectual impoverishment is, however, impetus to research. And now that the presence or absence of oxygen turns out not to be the factor which controls the growth of the bacillus of Welch, there is stimulus to try to find out what is the controlling factor, or rather what are the controlling factors. For—it being in the order of nature that things should never be too easy—there are bound to be many controlling factors. I and my fellow workers, Major Georges Dreyer at Boulogne and Dr. Alexander Fleming at St. Mary's, have consequently set ourselves to search for these controlling factors. In each case we set out to look for mechanical factors which might favour or hinder the growth of the bacillus of Welch.

The first question to which investigation was directed was the question as to what would be the effect of in the one case dispersing the implanted microbes through the culture

medium, and in the other case concentrating the infection in some one region of the culture medium. I had already 17 years ago, in a study* of the distribution of agglutinins and bactericidal substances in the body in cases of typhoid and Malta fever, called attention to the circumstance that microbes which would if carried into the blood stream have been killed or impeded in their growth by the bacteriotropic powers of the blood succeeded in maintaining themselves alive in the internal organs, collected together in what I called "niduses of lowered bacteriotropic pressure"—i.e., in regions where because collected together they can by active and passive chemical force maintain conditions propitious to their survival. In view of this analogy, and in view also of the circumstance that for the successful starting of a culture of the bacillus of Welch a large implantation is usually required, it appeared not unreasonable to inquire from experiment whether concentration of the infection comes into account also in connexion with growth upon artificial media.

The experiments were in each case carried out with measured volumes of glucose broth implanted with graduated additions of a suspension of Welch's bacillus, and cultivated anaerobically in capsules of glass tubing or capillary pipettes. In each case duplicate volumes were taken, and the one tube was cultivated lying flat and the other in the upright position—the microbes in this latter being concentrated at the bottom either by gravitation or centrifugalisation. In every series of such experiments—and in all eight were performed—the advantage from the point of view of successful cultivation of the microbe was with the series of tubes that were incubated in the upright position. The following may serve as an illustrative experiment.

Experiment 1.

A 24 hours culture of the bacillus of Welch, grown upon serum agar[1] in an atmosphere of coal-gas sealed up in a test-tube drawn out in the blow-pipe flame, was suspended in a convenient quantity of glucose broth. This suspension, enumerated in a Thoma-Zeiss cell, was found to contain 220,000,000 microbes (the actual figure arrived at was 217,600,000). From this a graduated series of dilutions were made in glucose broth. Two 20 c.mm. volumes of each dilution were then taken up into graduated capillary pipettes and anaerobic conditions were provided by driving the column of fluid down to the throttled distal end of the tube and then sealing up the proximal end filled with coal-gas.[2]

The cultural results are here set out in tabular form.

Experiment 1.

Serial number of the dilution.	Number of microbes in 20 c.mm. of that dilution.	Cultural result in the tube standing upright.		Cultural result in the tube lying flat.	
		After 24 hours.	After 48 hours.	After 24 hours.	After 48 hours.
1	400,000	Growth	Growth	Growth	Growth
2	80,000	Growth	Growth	Growth	Growth
3	16,000	Growth	Growth	Growth	Growth
4	3,200	Growth	Growth	Growth	Growth
5	640	Growth	Growth	0	Growth
6	128	Growth	Growth	0	Growth
7	25	Growth	Growth	0	Growth
8	5	0	Growth	0	0
9	1	0	Growth	0	0

An effect essentially similar to that produced by collecting the infection into a restricted region of the cultural fluid ought, as reflection will show, to be achievable also by dividing up the culture medium by a series of partitions. For the chemical effort which the microbes will have to put forth for the transformation of the provided culture medium into a really propitious medium will, when that is divided up, be concentrated upon a fraction of the whole.

The experiment, conducted in duplicate, set out in the table below seems to indicate that this does hold true.

Experiment 2.

Serial number of dilution.	Number of microbes in each 100 c.mm. of the dilution.	Volume of dilution taken for anaerobic culture in tubes lying flat.			
		100 c.mm. as a single unit.		100 c.mm. divided up by gas[3] into five units of 20 c.mm.	
		A.	B.	A.	B.
1	102,400	+	0	+ + + + 0	+ + + + 0
2	20,480	+	+	+ 0 0 0 0	+ + **0** 0 0
3	4,095	+	+	**0** + **0** 0 0	+ + + **0** 0
4	820	+	0	+ + + + +	0 0 0 0 0
5	165	+	+	0 + 0 0 0	+ + 0 0 0
6	35	+	+	+ + + 0 0	+ 0 0 0 0
7	7	+	0	0 + + 0 0	+ + 0 0 0

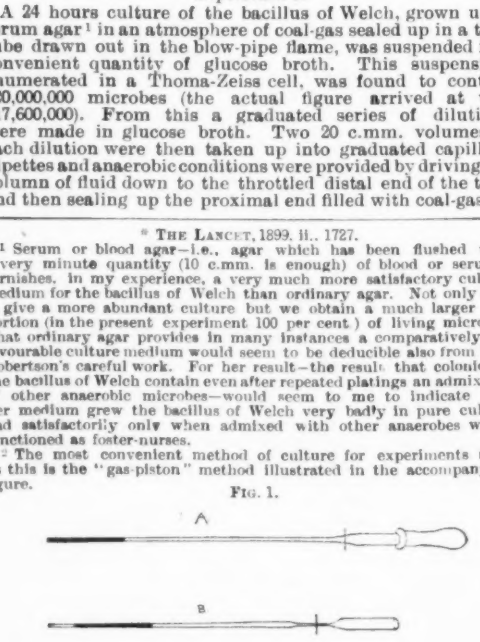
Other and more interesting experiments falling entirely into line with those which have been in question above are the experiments devised and carried out by Dr. Alexander Fleming. You have these cultural experiments in open tubes displayed for view here. We have, *first*, a culture of the bacillus of Welch obtained by introducing a pledget of asbestos into glucose broth left open to the air; *secondly*, a culture obtained under the same conditions with a pledget of cotton-wool; *thirdly*, a culture obtained by the addition of platinum black; *fourthly*, one obtained with a rust-covered nail; and *fifthly*, a culture obtained by introducing into the open bouillon a hair-fine capillary glass tube filled in with a minute quantum of a diluted culture. When we take cognisance of all these—and you see we have here in each case a turbid and vigorous gas-producing culture—and when we bring what we see here into relation with the fact that we obtain cultures also in open tubes containing potato,

* THE LANCET, 1899, ii., 1727.

[1] Serum or blood agar—i.e., agar which has been flushed with a very minute quantity (10 c.mm. is enough) of blood or serum—furnishes, in my experience, a very much more satisfactory culture medium for the bacillus of Welch than ordinary agar. Not only does it give a more abundant culture but we obtain a much larger proportion (in the present experiment 100 per cent.) of living microbes. That ordinary agar provides in many instances a comparatively unfavourable culture medium would seem to be deducible also from Miss Robertson's careful work. For her result—the result that colonies of the bacillus of Welch contain even after repeated platings an admixture of other anaerobic microbes—would seem to me to indicate that her medium grew the bacillus of Welch very badly in pure culture and satisfactorily only when admixed with other anaerobes which functioned as foster-nurses.

[2] The most convenient method of culture for experiments such as this is the "gas-piston" method illustrated in the accompanying figure.

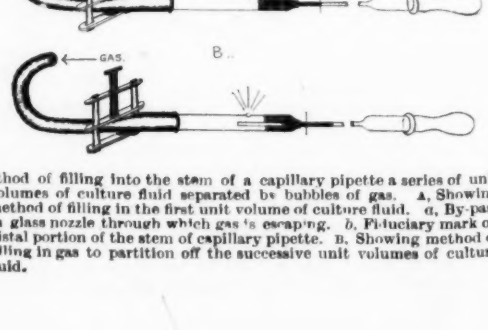
FIG. 1.



A. Capillary pipette filled in with culture fluid for anaerobic cultivation. B, The same pipette after drawing out in the flame of a by-pass. C, The stem of the pipette broken off at the throttle with the fluid shaken down to the distal end is introduced into a glass nozzle connected up with the gas-supply. D, After the fluid has been driven down to the distal end of the pipette by the piston action of the gas the tube is sealed up at the tip, and then in its middle in the flame of a by-pass.

[3] The dividing up of the column of fluid by bubbles of gas was carried out by the technique depicted in the subjoined figure.

FIG. 2.



Method of filling into the stem of a capillary pipette a series of unit volumes of culture fluid separated by bubbles of gas. A, Showing method of filling in the first unit volume of culture fluid. a, By-pass in glass nozzle through which gas is escaping. b, Fiduciary mark on distal portion of the stem of capillary pipette. B, Showing method of filling in gas to partition off the successive unit volumes of culture fluid.

carrot, white haricot beans, bread, cabbage, cheese, earth, desiccated and ground-up albumin, and other additions, it comes home to us that the common factor here must almost certainly be a mechanical factor. And that mechanical factor would appear to be the providing of some hole or cranny to serve as a nidus in which the microbe can get a start by concentrating its chemical effort at first upon a fractional portion of the provided culture medium. Again, when we look beyond these test-tube experiments to clinical facts we see that the supervention of gangrene is very frequently correlated with the leaving behind in the wound of infected portions of clothing; we see, in other words, that the same mechanical factor which is operative in the test-tube experiment would seem to come into account also in the body.

II. CONDITIONS WHICH GOVERN THE GROWTH OF THE BACILLUS OF WELCH IN THE BLOOD-FLUIDS.

(*a*) *Bactericidal Factor.*

In the matter of the culture of the bacillus of Welch in the blood-fluids the factor which more than any other factor comes into account is—and this was shown by Captain d'Este Emery when he was my fellow worker at Boulogne—the bactericidal action of the serum. The following experiment shows how considerable is this restraining and bactericidal action of the normal serum. It brings out also the fact that the implanted microbes have a better chance of surviving and establishing themselves when collected together than when dispersed through the blood fluids.

Experiment 3.

This experiment was a companion experiment to Experiment 1 (*supra*), and is to be read in connexion with it. The same bacterial suspension was employed and the procedure was, except in the respect that the dilutions were made in the author's serum instead of in glucose broth, the same.

Experiment 3 (Companion to Experiment 1).

Serial number of the dilution.	Number of microbes in 20 c.mm. of that dilution.	Cultural result in the tube incubated upright.	Cultural result in the tube incubated lying flat.
1	400,000	Growth	Growth
2	80,000	Growth	0
3	16,000	0	0
4	3,200	0	0
5	640	0	0
6	128	0	0
7	25	0	0
8	5	0	0
9	1	0	0

We see here (computing from the figures for the tubes lying flat, i.e., the tube in which the microbes were dispersed through the culture medium) that 1 c.c. of normal serum was capable of disposing of an implantation of 4,000,000 (80,000 × 50) gas gangrene bacilli, all of which bacilli were (as the control experiment, Experiment 1, shows) living bacilli.

(*b*) *Mechanical Factor.*

Also we can see here that advantage accrues to the blood-fluids when the microbes are dispersed and cannot coöperate, and disadvantage when the microbes are collected together and afforded an opportunity of making a combined attack. The influence of this factor of dispersing or concentrating the infection comes out more clearly when we make similar implantations into duplicate volumes of serum, we centrifuge the tube containing the one portion and incubate it upright, and leave the other tube uncentrifuged and incubate it lying flat.

In the following experiments the cultures were made anaerobically by the "gas-piston" method. The implantations were in Experiments 4 and 5 made by the "method of washes," i.e., they were made by filling into the pipette a unit volume of serum, then filling in a unit volume of the microbic suspension or a dilution of this suspension, expelling this, and incorporating the microbes left behind into the unit volume of serum. In Experiment 6 graduated dilutions of the bacterial suspension were made in serum.

Experiment 4.

—	Amount of microbic suspension implanted into serum. Washes. 4	3	2	1	½	¼
Centrifuged tubes incubated upright	Growth	Growth	Growth	0	0	0
Uncentrifuged tubes incubated lying flat	Trace	0	0	0	0	0

Experiment 5.

—	Amount of microbic suspension implanted into serum. Washes. 2	1	½	¼	⅛
Centrifuged tubes incubated upright	Growth and gas	—	Growth and gas	Growth and gas	Growth only.
Uncentrifuged tubes incubated lying flat...	Trace.	Trace.	Trace.	0	0

Experiment 6.

—	Bacterial suspension progressively diluted with neutralised serum. 2 fold.	4 fold.	8 fold.	16 fold.	32 fold	64 fold.	128 fold.
Centrifuged tubes incubated upright	Gr.	Gr.	Gr.	Tr.	Tr.	Tr.	0
Uncentrifuged tubes incubated lying flat	Tr.	Tr.	Tr.	0	0	0	0

Gr. = growth; Tr. = trace.

It comes out, as you will see, quite clearly in these experiments that the doctrine of the "non-bacteriotropic nidus"—which I suggested to explain the survival of microbes in an organism which has in its blood stream an ample provision of protective substances—is a doctrine which applies also to cultivations in serum conducted *in vitro*. And the full details of the experiments, if there were room to give them here, would bring out that the more rapidly the concentration of the implanted microbes is effected, and the shorter the preliminary exposure to the full bactericidal action of the serum, and again the less bactericidally potent the serum, the greater becomes the chance that an implanted microbe will get a start and go on from that to produce a generalised infection.

Up to this point the problem of the conditions which govern the growth of the bacillus of Welch in the blood-fluids has been treated as if practically all that was of moment was to withdraw by mechanical methods the implanted microbes from full exposure to bactericidal power of blood-fluids. But even here the factor which is in ultimate analysis the operative factor is, of course, the chemical factor. What comes into account is, on the one hand, the diminished mass effect exerted by the bacteriotropic action of the serum upon the microbes; and, on the other hand, the increased mass effect exerted upon the phylactic elements of the blood-fluids by the products elaborated by the chemical activity of the microbes.

When the bacillus of Welch grows freely in serum it reduces the antitryptic power of the medium and it elaborates acid. Concurrently, as it would seem with this, the microbe starts to grow with phenomenal rapidity after the manner of an avalanche gathering force as it goes. Our next task must be to inquire whether there is any causal relation between the reduction of antitryptic power and the avalanche-like progression of the culture.

(*c*) *Experiments showing that the Culture of the Bacillus of Welch in Serum is Largely Governed by the Antitryptic Power of the Blood.*

The question as to what it is that converts the pus of neglected wounds into an ideally propitious culture medium for the gangrene bacillus and every other species of microbe presented itself very early in the course of this war. To that question I proposed an answer, and I think with every day it has become clearer that it was the right answer. That answer was to the effect that what stands in the way of free growth of all micro-organisms in the blood-fluids is the antitryptic power. We have to suppose in connexion with this that the antitryptic power inhibits the digestive processes which must precede the conversion of the native albumins of the blood into congenial pabulum for

microbes. It therefore seemed to follow that if trypsin were directly added to the blood-fluids, or else if trypsin were indirectly added, and this is what occurs in stagnant pus by the disintegration of the leucocytes, we should have a corruption of the discharges, every manner of microbe cultivating itself there without restraint. In brief, what I suggested was that the antitryptic power is the guardian of the blood. In connexion with this I would point to the experiments of my fellow workers, Captains S. R. Douglas and L. Colebrook. They have shown that hæmocultures, otherwise so frequently infertile, can very often be rendered fertile by the addition of trypsin to the culture medium. And the following experiments, conducted with the bacillus of Welch, show exactly the same thing.

Experiment 7.

A 24 hours culture of the bacillus of Welch grown upon agar flushed with serum was suspended in a convenient quantum of glucose broth. This was found to contain 350 millions of bacilli per c.c. Graduated dilutions of the suspension were then made in a serum (A. E. W.'s) which neutralised an equal bulk of a 25-fold dilution of trypsin. Another precisely similar series of dilutions was made in another sample of the same serum to which had been added 1/25th of its bulk of the same sterile trypsin undiluted. Six 20 c.mm. volumes of each successive dilution of either serum were then taken up into calibrated capillary pipettes for anaerobic cultivation. The cultural results as determined by microscopic examination were as set out below.

Serial number of the dilution.	Number of microbes in the 20 c.mm. volume which was cultivated.	Unaltered serum. Number of fertile cultures.	Trypsinised serum. Number of fertile cultures.
1	7,000,000	6 out of 6	6 out of 6
2	1,400,000	5 ,, 6	6 ,, 6
3	280,000	0 ,, 6	6 ,, 6
4	56,000	0 ,, 6	5 ,, 6
5	11,200	0 ,, 6	2 ,, 6
6	2,240	0 ,, 6	0 ,, 6
7	450	0 ,, 6	0 ,, 6
8	90	0 ,, 6	0 ,, 6
9	18	0 ,, 6	0 ,, 6

We see here that for the infection of 20 c.mm. of trypsinised serum there were required 50 times fewer microbes (33,600 as contrasted with 1,700,000) than for the infection of the same quantity of unaltered serum.

Experiment 8.

Here in the one set of tubes a wash of trypsin followed by a wash, or fraction of a wash, of the bacillus of Welch were added to serum; in the control tubes larger quanta of microbial culture were implanted.

Control tubes	Serum + 3 washes of bacterial suspension	No growth.
	,, + 2 ,, ,, ,, ,,	,,
	,, + 1 wash ,, ,, ,,	,,
	,, + ½ ,, ,, ,, ,,	,,
	,, + ¼ ,, ,, ,, ,,	,,
Trypsin tubes	Serum + 1 wash trypsin, 1 wash bacterial suspension.	Abundant growth with gas.
	,, + 1 wash trypsin, ½ wash bacterial suspension.	,,

Experiment 9.

Here the same procedure was followed.

Control tubes containing normal serum	Serum + 4 washes of bacterial suspension.	No growth.
	,, + 3 ,, ,, ,, ,,	,,
	,, + 2 ,, ,, ,, ,,	,,
	,, + 1 wash ,, ,, ,,	,,
	,, + ½ ,, ,, ,, ,,	,,
	,, + ¼ ,, ,, ,, ,,	,,
Tubes containing trypsinised serum	,, + 2 washes ,, ,, ,,	Abundant growth with gas.
	,, + 1 wash ,, ,, ,,	,,
	,, + ½ ,, ,, ,, ,,	,,
	,, + ¼ ,, ,, ,, ,,	,,

Experiment 10.

Here again the same technique was employed except in the respect that the trypsinised serum was prepared by adding 1 unit volume of trypsin respectively to 9, 19, and 39 unit volumes of serum. The serum was A. E. W.'s serum, which neutralised an equal volume of a 25-fold dilution of trypsin. The cultural results were as set out below.

—	Amount of bacterial suspension implanted. Washes— 3	2	1	½	¼	⅛
Serum without addition... ...	Tr.	Tr.	0	0	0	0
Serum + 1/40th of its volume of trypsin	Gr.	Gr.	Tr.	Tr.	Tr.	0
Serum + 1/20th of its volume of trypsin	Gr. & gas.	Gr. & gas.	Gr. & gas.	Gr. & gas.	Gr. & gas.	Gr. & gas.
Serum + 1/10th of its volume of trypsin	Gr. & gas.	Gr. & gas.	Gr. & gas.	Gr. & gas.	Gr. & gas.	Gr. & gas.

To this experiment may be added the following which brings out that there is a general but not a perfect correlation between the antitryptic power of the serum and its power of resisting infection by the bacillus of Welch.

Experiment 11.

Derivation of the serum.	Antitryptic power* of the serum.	Infection-resisting (phylactic) power. Amount of culture implanted. Washes. 3	2	1	½	¼	⅛
Patient with serious compound fracture.	10 units (reciprocal of T/10).	0	0	0	0	0	0
Patient with perforating wound of chest.	6·6 units (reciprocal of T/15).	Tr.	0	0	0	0	0
Patient with gangrene infection of leg.	6·6 units (reciprocal of T/15).	Gr.	0	0	0	0	0
Patient with serious flesh wound.	5 units (reciprocal of T/20).	Gr.	Gr.	Gr.	Gr.	Gr.	
Patient with serious flesh wound.	5 units (reciprocal of T/20).	Gr.	Tr.	0	0	0	0
Normal man.	5 units (reciprocal of T/20).	Gr.	Gr.	Gr.	0	0	0

* Here, as elsewhere, the antitryptic power was measured by finding out what dilution of trypsin was neutralised by an equal volume of serum. By dividing in each case the figure representing this dilution into 100 we obtain the reciprocals, figures which provide a very convenient expression for the results of antitryptic measurement.

(*d*) *Experiments showing that the Growth of the Bacillus of Welch in the Blood-Fluids is Promoted by the Addition of Acid.*

When one notes that the bacillus of Welch when growing freely in serum turns it acid; and when we then reflect upon the fact that all serum cultures of the microbe, whether *in vitro* or in the living body, begin with difficulty, and then, after reaching a certain critical point, progress at the rate of an avalanche, one inevitably, as in regard to the reduction of the antitryptic power of the serum, asks oneself whether the characteristic avalanche-like acceleration of growth may not be a direct result of this particular change in the medium.

The answer is given in the following experiments.

Experiment 12.

Seven unit volumes of serum were neutralised by the addition of 2 unit volumes of a N/10 sulphuric acid—the control sample of serum being diluted to the same extent with physiological saline solution. This done, the antitryptic power of the two samples of serum was measured. It worked out in each case as 3 (approximately)—i.e., a unit volume of each of the sera neutralised a 40-fold and failed to neutralise a 30-fold dilution of the trypsin. These preliminaries completed, the resistance of the two sera to infection by the bacillus of Welch was investigated by aspirating into a capillary pipette a unit volume of a thick bacterial suspension, and following up in each case (I call this the after-wash method) by a series of unit volumes of serum.

—	Cultural results. After-wash. 1st.	2nd.	3rd.	4th.	5th.	6th.	7th.
Neutralised serum	Gr.	Gr.	Gr.	Gr.	Gr.	Gr.	Gr.
Correspondingly diluted serum	0	0	0	0	0	0	

These successive after-washes were divided off by bubbles of coal-gas introduced by the technique already explained (*vide* Footnote 3). The results after 24 hours culture were as shown in the preceding table.

Experiment 13.

As in the last experiment 7 unit volumes of serum were mixed in the one case with 2 unit volumes of N/10 sulphuric acid, and in the other with 2 unit volumes of physiological salt solution. The sera were then put away for 24 hours. The antitryptic power of each sample of serum was then tested. It worked out, in the case of the *neutralised serum*, as less than 3·3 units and greater than 2·5 units, in the case of the correspondingly *control sample of serum* as less than 4 units and greater than 3·3 units. Graduated dilutions of a suspension of Welch's bacillus were then made upon slides by the wash-volume (W/V) method—i.e., in each case a wash of bacterial suspension or implanted serum was carried over into a unit volume of serum to make the next dilution in series. An unmeasured sample of the whole series of dilutions was then drawn up into the stem of a capillary pipette, the successive volumes being separated by bubbles of coal-gas. The experiment was in the case of each serum carried out in duplicate. The cultural results were as follows.

—	Cultural results. Dilution— 2	4	8	16	32	64	128
Neutralised serum.							
Pipette No. 1	Gr.	Gr.	Gr.	Gr.	Gr.	Gr.	Gr.
,, No. 2	Gr.	Gr.	Gr.	0	0	0	0
Control serum.							
Pipette No. 1	Tr.	0	0	0	0	0	0
,, No. 2	0	0	0	0	0	0	0

Experiment 14.

Normal serum was neutralised by the addition of N/10 sulphuric acid and then mixed with one-ninth of its bulk of a five-fold dilution of trypsin. The control sample of serum was diluted to the same extent with 0·85 per cent. NaCl solution. Both specimens were then implanted with a suspension of the bacillus of Welch by the after-wash method.

—	Cultural results. After-wash. 1st.	2nd.	3rd.	4th.	5th.	6th.	7th.	8th.
Neutralised and trypsinised serum	Gr.	Gr.	Gr.	Gr.	Gr.	Gr.	Gr.	Gr.
Control trypsinised serum ...	Gr.	0	0	0	0	0	0	0

Experiment 15.

This experiment given in tabular form below is self-explanatory.

Serum implanted with 3 washes of bacterial suspension ...	No growth.
,, ,, ,, 2 ,, ,, ,,	,, ,,
,, ,, ,, 1 wash ,, ,, ,,	,, ,,
Serum neutralised (by adding 2 volumes of N/10 sulphuric acid to 7 volumes of serum) and implanted with 1/5th wash of bacterial suspension	Copious growth.
Serum acidified (by adding 3 volumes of N/10 sulphuric acid to 7 volumes of serum) and implanted with 1/5th wash of bacterial suspension	Copious growth.

This series of experiments make it, as it seems to me, quite indubitable that additions of acid convert the serum into an eminently favourable medium for the bacillus of Welch, and it is clear from the data set forth in connexion with Experiments 12 and 13 that this effect is obtained quite apart from any reduction of the antitryptic power. We have seen that the converse of this last also holds true, the reduction of antitryptic power quite apart from any addition of acid, converts the serum into a very favourable culture-medium for the micro-organism. And I think there can be no question that when these two factors coöperate we have a combination which adequately accounts for the avalanche phenomenon, if I may so call it, which is the outstanding feature in the biology of the bacillus of Welch both when it grows in the blood-fluids *in vitro*, when it grows in the dead body, and when in the living body it invades the tissues, giving rise to spreading "gas gangrene." We have next to study the growth of the bacillus of Welch in the dead body.

III. CONDITIONS WHICH GOVERN THE GROWTH OF THE BACILLUS OF WELCH IN THE DEAD BODY.

Already in Welch's very first publication upon the *Bacillus aerogenes capsulatus*—the microbe which now bears his name—it is put upon record that if a small volume of culture is introduced into the blood stream of a rabbit, and the animal is then killed and put into the incubator, the whole organism will be rapidly invaded, gas being generated in the blood, the condition known as "foaming liver" being produced, and the peritoneal cavity being, after six or more hours, blown out with gas. As soon as we set ourselves to think out what all this imports, we see that it must mean that the chemical changes occurring in the blood and liver after death transform the blood-fluids into an eminently favourable medium for the cultivation of the bacillus of Welch.

The following experiments show that this surmise is quite correct.

Experiment 16.

Rabbit No. 1.—The animal, injected intravenously with 3 c.c. of a broth culture of the bacillus of Welch, was killed five minutes after, and was then placed in the incubator. A sample of blood was taken before and a series of samples after injection. In each case film preparations were made and examined, and measurements of the antitryptic power and of the blood alkalinity were undertaken. These are recorded in tabular form below. In regard to the film preparations, it will suffice to say that no microbes were microscopically discoverable in any but the last specimen; here they were numerous. After six hours the animal was blown up with gas and the liver was foaming.

Times when the samples of blood were collected.	Measurements of antitryptic power and chemical reaction of the serum. Antitryptic power.	Chemical reaction.*
	Units.	
Immediately before injection	3	Alkaline, N/40
5 min. after injection	2	—
10 ,, ,, ,, (heart blood)	1·6	Alkaline, N/50
3 hrs. ,, ,, ,, ,, ...	1·6	,, N/60
6 ,, ,, ,, ,, ,, ...	—	Acid.

* Here and elsewhere in this paper the alkalinity of the blood was measured by the method described in the author's "Technique of the Teat and the Capillary Glass Tube" (Constable, London).

We have here evidence that, presumably as a result of a destruction of leucocytes, the antitryptic power of the blood is progressively reduced, and that, no doubt as a consequence of lactic acid production in the muscles, the blood-fluids lose their alkalinity and finally become acid. One can hardly doubt that it is these changes which help forward the growth of Welch's bacillus in the dead rabbit. That the anaerobic conditions do not play here any responsible rôle will appear in connexion with Experiments 19 and 20.

Experiment 17.

Rabbit No. 2.—The animal was injected intravenously with 1 c.c. of an aerobically grown potato-broth culture, and was killed immediately after. As in the last case, film preparations of the blood were examined and measurements of the antitryptic power and alkalinity carried out. In films made 3½ hours after death hardly any microbes could be detected. In preparations made 4½ hours after death they numbered 6–8 to the microscopic field. At the end of six hours the animal was blown up with gas, and the liver was honeycombed with small cavities containing a foaming and tryptic fluid.

Times when the samples of blood were collected.	Measurements of antitryptic power and chemical reaction of the serum. Antitryptic power.	Chemical reaction.
	Units.	
Immediately before injection	4·5	—
15 min. after injection (heart blood)	5·5	Alkaline, N/35
3½ hrs. ,, ,, ,, ,, ...	4·5	,, N/80
4½ ,, ,, ,, ,, ,, ...	3·6	—
6 ,, ,, ,, ,, ,, ...	2·2	Acid.

Experiment 18.

Rabbit 3.—This received intravenously 1 c.c. of a culture of the bacillus of Welch grown aerobically in potato broth, and the animal was killed 15 minutes after the injection and

placed in the incubator. Samples of blood were taken and examined as in the previous experiments. A single microbe was found in the blood film made 2 hours after death. The liver 7 hours after death was torn to pieces by gas and looked, except for the fact that its colour was a dark brown red, like a mass of coral as obtained from the swimmerets of a hen-lobster; films prepared from it showed an almost solid mass of microbes. The results of the measurements of antitryptic power and blood reaction are subjoined.

Times when the samples of blood were collected.	Measurements of antitryptic power and chemical reaction of the serum.	
	Antitryptic power.	Chemical reaction.
	Units.	
Immediately before injection	3	Alkaline, N/30
15 min. after injection...	3	,, N/30
2 hrs. ,, ,, (heart blood)	1·8*	Acid.
4 ,, ,, ,, ,, ,, ...	1·6*	Acid.

* Measured after serum had been neutralised with washes of N/10 NaOH.

Experiment 19.

Rabbit 4.—A sample of blood was taken from this animal, and it was then, without receiving any injection, killed and placed in the incubator. The second samples of blood were taken 3 hours after death respectively from the S.V.C. and from the I.V.C. and hepatic vein. Sample 3 was taken from the heart 5 hours after death. The results of the measurements of antitryptic power, blood reaction, and infection resisting power are subjoined.

—	Antitryptic power.	Chemical reaction.
Serum, Sample 1	3 units.	Alkaline, N/30
,, ,, 2	3 ,,	,, N/80
,, ,, 2a	Tryptic.*	Acid N/150
,, ,, 3	,, *	,, N/75

Infection Resisting (Phylactic) Power.

—	Amount of culture implanted. Washes—							
	3	2	1	½	¼	⅛	1/16	1/32
Serum Sample 1 ...	0	0	0	0	0	0	0	0
Serum Sample 2 ...	—	—	Growth and gas.	Growth and gas.	Growth and gas.	Growth and gas.	Growth and gas.	Growth and gas.
Serum Sample 2a...	—	—	Growth and gas.	Growth and gas.	Growth and gas.	Growth and gas.	Growth and gas.	Growth and gas.

* Determined after serum had been neutralised by washes of N/10 NaOH.

It is evident from the results set out here that the blood changes which convert the blood-fluids after death into an eminently favourable culture medium for the bacillus of Welch are chemical changes which occur spontaneously, and quite independently of the inoculation of the bacillus of Welch. Furthermore, when we consider the cultural results set out in the second of the two tables, bearing in view that the cultures were in each case made anaerobically, we recognise that the circumstance that the fact that anaerobic conditions such as these prevail in the dead body is a fact which can have nothing to do with the rapid pullulation of the microbe.

Experiment 20.

Here a sample of blood was taken from a cat and the animal was then immediately killed and placed in the incubator. Sample 2 was taken from the heart three hours after; Sample 3 six hours after. As in the last case, the antitryptic power, the blood reaction, and infection-resisting power of these samples were measured. It will be seen that except for the fact that the antitryptic power is maintained unaltered the results are precisely the same as those obtained in the rabbit.

—	Antitryptic power.	Chemical reaction.
Serum, Sample 1 ...	4	Alkaline, N/50
,, ,, 2 ...	4	,, N/120
,, ,, 3 ...	4	Faintly acid.

Infection Resisting (Phylactic) Power.

	Amount of culture which was implanted. Washes.				
	3	2	1	½	¼
Serum, Sample 1...	0	0	0	0	0
,, ,, 2...	Growth and gas.	Growth and gas.	Growth and gas.	Growth and gas	Growth and gas.
,, ,, 3...	—	Growth and gas.	Growth and gas.	—	Growth and gas.

IV. CONDITIONS WHICH GOVERN THE GROWTH OF THE BACILLUS OF WELCH IN THE LIVING ORGANISM, IN PARTICULAR ON THE BLOOD CHANGES WHICH SUPERVENE (*a*) WHEN THE BACILLUS OF WELCH IS INOCULATED INTO THE BLOOD STREAM OR SUBCUTANEOUS TISSUE, AND (*b*) WHEN THE MICROBE INVADES THE TISSUES FROM A WOUND PRODUCING GAS GANGRENE AND THE CHARACTERISTIC TOXÆMIA WHICH IS ASSOCIATED WITH THIS.

Disposing my data in accordance with the scheme thus indicated I may set forth first, adding here and there brief comment, certain data furnished by blood examinations undertaken upon rabbits inoculated intravenously with cultures of the bacillus of Welch.

(*a*) *Experiments in which the Bacillus of Welch was Inoculated Intravenously into Rabbits.*

Experiment 21.

Rabbit 5.—This was a companion rabbit to Rabbit 4 (Experiment 18), and it was inoculated intravenously with 1 c.c. of the same potato broth culture as was there employed. A comparison of the figures given below with those given in connexion with Experiment 18 shows up to the 19 hours after the injection profound differences here, the alkalinity of the blood between the two remaining practically unaffected and the antitryptic power sinking away only very slowly. Thereupon, apparently quite suddenly the rabbit became collapsed and the circulation flagged so much that blood was unobtainable from the ears (these were stone cold) and had to be drawn off from the femoral artery. Respiration was 80 to 100 in the minute, and the clinical picture corresponded to that of the classical "acid rabbit" of Walther and Stadelmann—i.e., to the clinical picture seen when a rabbit is overdosed with hydrochloric acid. The details of the experiment are as follows.

Times when the samples of blood were collected.	Measurements of antitryptic power and alkalinity.	
	Antitryptic power.	Alkalinity of blood.
Immediately before injection	3·6	N/30
15 minutes after injection	2·2	—
4 hours ,, ,, ...	3·0	—
19 ,, ,, ,, ...	2·5	N/35
21 ,, ,, ,, ...	4·0	N/50
23½ ,, ,, ,, (1¼ hours after death)	1·6	N/180

Owing to the difficulty of procuring sufficient rabbits only two more experiments of this kind were made. Both of these, so far as the first hours of observation are concerned, confirmed the results of Experiment 21; but neither of them gave any evidence in corroboration of the view that death in infection by the bacillus of Welch is ushered in by an acidæmia. In view, however, of the circumstance that there were in each a formidable lacuna in the observations, the animal in each case dying unexpectedly in the night, the fact that evidence of the supervention of acidæmia is wanting must be discounted. The data relating to one of the two rabbits—a rabbit that was found dead in 18 hours after the intravenous injection of a small quantum of culture—are given below.

Experiment 22.

Times when the samples of blood were collected.	Measurements of antitryptic power and alkalinity.	
	Antitryptic power.	Alkalinity of blood.
Immediately before injection	3·0	N/40
10 minutes after injection	2·6	N/40
30 ,, ,, ,, ...	2·0	N/40
2 hours ,, ,, ...	2·0	N/40
6 ,, ,, ,, ...	1·5	N/45

We pass now from the consideration of rapidly fatal intravenous inoculations to which there is no obvious immunising response to study the effects of subcutaneous inoculations

in the case of animals who for the most part respond and survive.

(b) Experiments in which the Bacillus of Welch was Inoculated Subcutaneously into Guinea-pigs and White Rats.

Here also observations were made upon the antitryptic power and the alkalinity of the serum from the circulating blood. In addition—for it was possible to do this until such time as the local effusion was either absorbed or broke through the skin and was lost—determinations were made also of the antitryptic power and alkalinity prevailing at the seat of the inoculation. In each case the results are set out in the form of charts. Upon these the unbroken line is the curve obtained from the circulating blood; the interrupted line the curve from the œdema fluid. And in each case the scale is a scale of reciprocals—i.e., the figures are the quotients obtained by taking the dilution of the reagent which neutralised the effect of an equivalent volume of serum and dividing this into 1000.

CHART I.

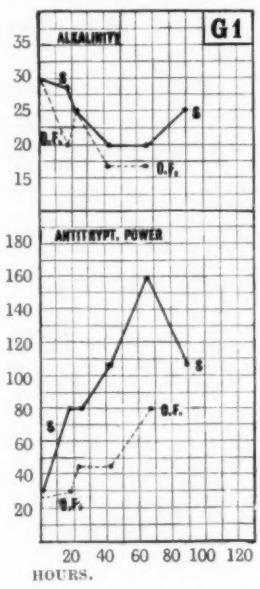


CHART II.

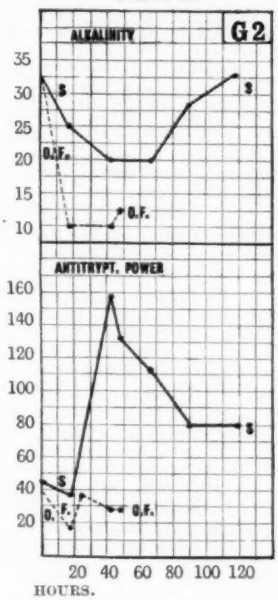
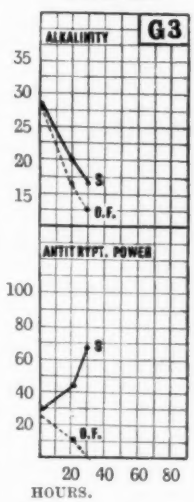


CHART III.



Experiment 23.

Guinea-pig No. 1. — The animal was inoculated subcutaneously in the leg with 0·1 c.c. of a 24-hour-old potato-broth culture aerobically grown. Beginning in the leg the effusion gradually spread over the whole of the belly, and finally after three days the skin broke down and the animal afterwards recovering and the wound healing over. The film preparations made from the effusion showed at first very numerous and afterwards only few bacilli. (See Chart I., G 1.)

Experiment 24.

Guinea-pig No. 2. — The animal was inoculated subcutaneously with 0·3 c.c. of a 24-hour-old potato-broth culture aerobically grown. Local effusion was well developed after 18 hours; it increased in quantity up to the 48 hours and then broke through upon the skin and leaked away, the wound afterwards healing up and the guinea-pig making a good recovery. (See Chart II., G 2.)

Experiment 25.

Guinea-pig No. 3.—The animal was inoculated subcutaneously with 0·3 c.c. of a 24-hour-old potato-broth culture aerobically grown. Local effusion was well developed after 21 hours. After 27 hours the subcutaneous tissue, as soon as it became flaccid through withdrawal of fluid, filled up rapidly with gas, and the animal died 33 hours after the injection. (See Chart III., G 3.)

Experiment 26.

White rat No. 1. — The animal was inoculated subcutaneously with 0·7 c.c. of a 24-hour-old potato-broth culture aerobically grown. Local effusion was well developed 16 hours after, and from the second day onwards the lesion became indurated and the œdema gradually disappeared, the animal making a perfect recovery. (See Chart IV., R 1.)

Experiment 27.

White rat No. 2. — The animal was inoculated subcutaneously with 0·6 c.c. of a 24-hour-old potato-broth culture. The local lesion ran the same course as in the first rat, and the animal, after being very ill for two days, made a perfect recovery. (See Chart V., R 2.)

Experiment 28.

White rat No. 3. — The animal was inoculated subcutaneously with 3/5ths of a 24-hour-old potato-broth culture. There was less effusion than in the case of the first two rats, and by the second day it had been completely absorbed. The animal was never really ill. (See Chart VI., R 3.)

It is brought out very clearly in these charts that infection by the bacillus of Welch produces as a rule both a local and a general acidosis, and it will be seen—and, of course, this was to be expected *a priori*—that we have always a more pronounced acidosis in the local lesion than in the general blood stream. Where, as in Chart III., the acidæmia becomes very pronounced the animal succumbs. And where, as in Chart VI., there is no acidæmia the animal is never seriously ill. Turning to the antitryptic power, we see that in all cases without exception—and when we turn back we can see indications of this also in the rabbit experiments

CHART IV.

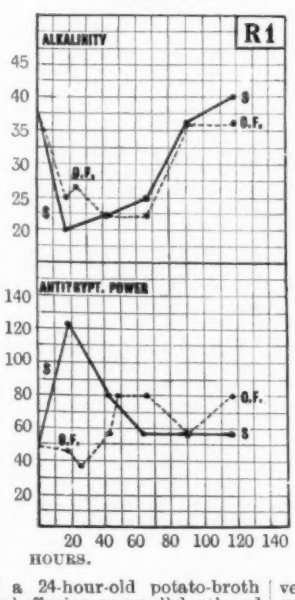


CHART V.

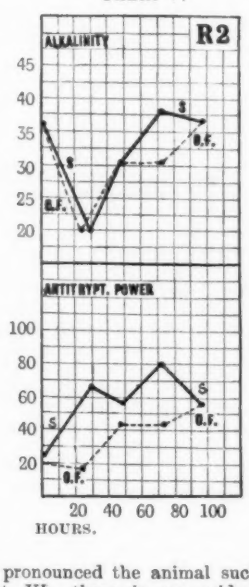
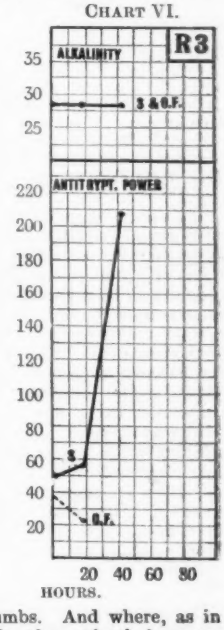


CHART VI.



(*vide* Experiments 21 and 22)—the curve which represents the antitryptic power of the blood rises. It rises very steeply where, as in Chart VI., the animal deals triumphantly with its infection; and it rises only very little where, as in Chart III., the animal puts up only a very feeble fight.

It also holds true of the curve of the antitryptic power of the œdema fluid in Charts I., II., IV., and V. that as the animal begins to recover it rises, following the curve of the blood, and we see in Chart III. that the œdema fluid may become tryptic in the case where the animal fails to stand up against the infection.

(*c*) *Observations Made on Man.*

We have now by experiments conducted *in vitro*, and in the dead, and living animals, collected sufficient data to enable us to construe aright such observations as it may be practicable to make upon men suffering from wounds infected by the bacillus of Welch, or from that spreading tissue infection which is spoken of as "gas gangrene," or again from that sharply characterised toxæmic condition which is the ultimate outcome of that infection.

A commencement may be made by setting out in tabular form the results of a series of antitryptic measurements made by me on three consecutive days in a casualty clearing station. These results relate to men all recently admitted to hospital with severe and highly infected wounds—cases of manifest "gas gangrene" being here specially excluded. I may further explain that many of the cases who were examined on the first day were examined also on the second, and similarly many of the cases examined on the second were re-examined on the third day. (See Table I.)

TABLE I.—*Measurements of the Antitryptic Power of the Blood of Normal Men, Slightly Wounded Men, and Heavily Wounded Men, excluding those affected with "Gas Gangrene."*

—	Normal men.			Slightly wounded men.		Heavily wounded men, excluding cases of gas gangrene.	
Date.	A.T.P. of the individual men.		Average.	A.T.P. of the individual men.	Average.	A.T.P. of the individual men.	Average.
5 : 1 : 16	4·4	4·4	4·4 units	5·7 3·6 4·4 4·4 11·4 4·4 4·4	5·5 units	11·4 8·0 11·4 8·0 4·4 11·4 5·7 6·6 5·0 8·0 13 3	8·5 units
6 : 1 : 16	5·7	4·4	5·0 units	5·7 5·7 5·7 5·7 5·7	5·4 units	11·4 10·0 16·0 16·0 11·4 5·7 5·7	10·9 units
7 : 1 : 16	4·4	5·0	4·7 units	8·8 4·4 4·4 5·7 5·7 8·0	6·3 units	22·2 11·4 18·1 18·1 11·4 13·3 18·1	16·1 units
Summary			4·7 units	—	5·8 units	—	11·3 units
Antitryptic index ...			1		1·23		2·4

It is brought into clear view by the summary that—and I have already on previous occasions emphasised this point—every microbic infection of wounds (and the same probably holds of all microbic infections and inoculations of vaccine) is followed by a rise in the antitryptic power constituting a non-specific immunising response—that response being greater or less in accordance with the degree of the severity of the infection. Moreover, consideration of the figures for the successive days indicates that as the septic condition develops the antitryptic power gradually increases. I next take from the foregoing table its data relating to the antitryptic power in heavily infected patients not affected with "gas gangrene," supplement these with data furnished by measurements of their blood alkalinity; and then contrast these with data furnished by measurements of antitryptic power and blood alkalinity carried out on "gas gangrene" patients, adding also for comparison figures which apply to normal men.

These data are incorporated in Table II.

Scrutiny of this table reveals that there is with regard to antitryptic power absolutely no difference between heavily infected patients not suffering from "gas gangrene" and patients suffering from that infection. When, however, we turn to the column headed "Blood alkalinity," we see that while the blood alkalinity of the heavily infected patient corresponds exactly with the normal, in the "gas gangrene" patient, and, of course, only quite pronounced cases of "gas gangrene" were taken for examination, the blood alkalinity is very markedly reduced. In other words, the figures here brought together bring out the fact that the toxæmia of gas gangrene is an acidæmia.

TABLE II.—*Summary of Measurements of Antitryptic Power and Blood Alkalinity made upon Heavily Infected Patients not affected with "Gas Gangrene," and "Gas Gangrene" Patients respectively.*

—		Antitryptic power.	Blood alkalinity.
Heavily infected patients exclusive of cases of spreading gas gangrene bacillus infection.	Number of patients examined.	25	10
	Range of variation within the group.	5·7-22·2 units. (Vide Table I.)	N/30-N/35
	Average for the group.	11·3 units.	N/31·5
Patients suffering from spreading gas gangrene bacillus infection and intoxication.	Number of patients examined.	14*	15*
	Range of variation within the group.	5-22 units. (Vide Table III.)	N/40-N/80
	Average for the group.	11·2 units.	N/55
Normal men		4·7	N/30-N/35

* The majority of these patients are those included in Table III.

In Table III., concentrating here upon cases of "gas gangrene," I go more into detail and set out a series of measurements of the antitryptic power and alkalinity of the circulating blood in "gas gangrene" and also measurements of the antitryptic power and alkalinity of lymph obtained from the infected tissues. At the end of the table I add, for purposes of comparison the details of the examinations made in two cases which might—though, in point of fact, the error was in neither case committed—have been regarded as "gas gangrene" cases. I further include in the table six observations bearing on the treatment of gas gangrene acidæmia by the intravenous administration of alkalies.

Data Furnished by Measurements of the Antitryptic Power and Alkalinity of the Circulating Blood and of the Lymph from the Infected Tissues in Cases of "Gas Gangrene."

Consideration of the data which are set out in Table III. makes, as I think, quite clear that we are, in the so-called "gas gangrene infection" of man, dealing with essentially the same phenomena as in our laboratory experiments. We saw in *in vitro* cultures in serum that the bacillus of Welch diminishes the antitryptic power of the medium and renders it acid; and we saw that the serum is by these means converted into a pre-eminently favourable medium for the growth of the bacillus. In experiments on the blood in the dead body we saw that it is these chemical changes which furnish the conditions required for the avalanche-like inroad of the bacterial infection. And, finally, experiments upon living animals showed that we have in infections by the bacillus of Welch, *with respect to alkalinity*, a reduction in the fluids taken from the focus of infection, and also a reduction in the circulating blood; and, *with respect to antitryptic power*, in the circulating blood, a marked immunising response, while we have in the infected tissues a diminished or abolished antitryptic power, especially where the animal is only unsuccessfully combating or succumbing to the infection.

Every one of these points obtrudes itself again upon our notice in the records dealing with human "gas gangrene" which are brought together in Tables II. and III. We have there, to begin with, the high antitryptic response in the circulating blood and the reduced or abolished antitryptic power in the infected tissues or infected effusions. We have, in addition, diminished alkalinity in the infected tissues or infected effusions. And we have not only a local acidosis, but we have also an acidæmia. We find that acidæmia where the infection has culminated in that "gas gangrene toxæmia" which is ushered in by vomiting and then shows itself in collapse, with rapid respiration, ashy-grey pallor, feeble and then impalpable pulse, the body becoming stone-cold before death, first the hands and feet, then the whole limbs, finally the nose, ears, and forehead, the patient remaining with clear intellect and without suffering to the last.

It may perhaps, pending further investigation, be assumed with respect to this acidæmic condition that the acid production proceeds not only in the infected tissues standing in

TABLE III.

Serial number.	Brief outline of the case.	Data with regard to the antitryptic power and alkalinity of the blood.	Data with regard to the antitryptic power and alkalinity of the lymph in the infected tissues.
1	Spreading gangrene bacillus invasion in subcutaneous tissue of arm, with coppery discolouration and crepitation. Amputation of arm.	*A.T.P.*, 8 units.	Œdema fluid from tissues close to the wound: *Tryptic.* Œdema fluid from spreading edge: *A.T.P.*, 2·2.
2	Clinical features as in Case 1.	*A.T.P.*, 6·6 units.	Œdema fluid from tissues above the wound: *A.T.P.*, 1·6.
3	Multiple shrapnel wounds of leg with spreading gangrene bacillus infection in subcutaneous tissue. Acute toxæmia, with rapid respiration, impalpable pulse, and cold creeping upwards from extremities. Intravenous injection of 16 grammes of $NaHCO_3$. Death 12 hours after onset of toxæmic symptoms.	Before intravenous injection: *Alkalinity*, N/80; *A.T.P.*, 6·6 units. 10 minutes after injection: *Alkalinity*, N/50; *A.T.P.*, 6·6 units.	—
4	Extensive wound of thigh. Spreading gangrene bacillus infection involving knee and spreading in subcutaneous tissue of the thigh with crepitation. Amputation of thigh. Death 48 hours after operation.	*A.T.P.*, 11·4 units. *Alkalinity*, N/50.	Fluid from knee: *A.T.P.*, 2 units; *Alkalinity*, N/50. Fluid from subcutaneous tissue: *A.T.P.*, 3·3 units; *Alkalinity*, N/40.
5	Compound fracture of thigh with extensive flesh wound. Rapidly spreading gangrene bacillus infection of tissues. Acute toxæmia. Icteric serum*; culture of the bacillus of Welch from blood 4½ hours, intravenous injection of 8 grammes of $NaHCO_3$ 8 hours, and death 14 hours, after onset of toxæmic symptoms.	Before intravenous injection: *A.T.P.*, 5 units; *Alkalinity*, N/50. 5 minutes after injection: *A.T.P.*, 5 units; *Alkalinity*, N/50. 6 hours after injection: *A.T.P.*, 5 units; *Alkalinity*, N/50.	—
6	Compound fracture of ankle. Acute toxæmia with collapse, precluding operation. Injection of 20 grammes of lactate of soda. Condition rapidly improved and amputation carried out. In evening patient was sitting up, next morning general condition very satisfactory, and patient made a good recovery.	Before injection: *Alkalinity*, N/50. Immediately after: *Alkalinity*, N/50. 7 hours after: *Alkalinity*, N/50. Next morning: *Alkalinity*, N/40	—
7	Extensive wound in upper third of arm. Gangrene with dark livid discolouration and hæmorrhagic blisters, with purple mottling extending over the shoulder. Profound toxæmia; 10 grammes of $NaHCO_3$ intravenously. Disarticulation at shoulder. Next morning general condition satisfactory and patient made a good recovery.	At time of operation: *Alkalinity*, N/70. 6 hours after: *Alkalinity*, N/60. Next day: *Alkalinity*, N/40.	Œdema fluid from upper arm: *Alkalinity*, N/200. Œdema fluid from lower arm: *Alkalinity*, N/60.
8	Very numerous shrapnel wounds of both legs. Gangrene bacillus infection spreading out from these in the form of infiltrated copper-coloured patches.	*A.T.P.*, 20 units; *Alkalinity*, N/50.	Œdema fluid from infiltrated copper-coloured patches: *A.T.P.* 6·6 units; *Alkalinity*, N/60.
9	Gangrene of leg spreading upwards. Amputation at middle of thigh.	*A.T.P.*, 8 units.	*A.T.P.* of œdema fluid from spreading edge, 2·9 units
10	Massive gangrene infection of all muscles of anterior aspect of thigh.	*Alkalinity*, N/60.	Clear fluid from wound: *Alkalinity*, N/60.
11	Hæmothorax infected with Welch's bacillus and containing many W.B.C. Icteric serum.	*A.T.P.*, 13·3 units; *Alkalinity*, N/50.	Pleural effusion: *A.T.P.*, 6·6 units; *Alkalinity*, N/100.
12	Hæmothorax film preparations show 20 or more *B. Welch* in each microscopic field. No indications of growth in effusion when cultured, and growth on artificial media only when very large quanta are implanted.	*A.T.P.*, 22 units; *Alkalinity*, N/40	*A.T.P.*, 8 units; *Alkalinity*, N/100.

TABLE III.—(*Continued*).

Serial number.	Brief outline of the case.	Data with regard to the antitryptic power and alkalinity of the blood.	Data with regard to the antitryptic power and alkalinity of the lymph in the infected tissues.
13	Patient admitted with an enormous wound in groin and in a condition of collapse. Recovered sufficiently to allow of incomplete operation. 24 hours later vomiting and very feeble, rapid pulse. Intravenous injection of 20 grammes of $NaHCO_3$. Next day some improvement. Day after patient succumbed.	*Alkalinity*, N/40 of blood collected circ. 18 hours after operation.	—
14	Amputation after 4 days in hospital of thigh for gas gangrene starting from wound of leg and knee. 24 hours after patient was still very weak. 40 hours after operation 10 grammes of $NaHCO_3$ intravenously. Patient succumbed 24 hours later.	Blood taken at time of operation: *A.T.P.*, 16 units; *Alkalinity*, N/60. Blood taken 24 hours after operation: *A.T.P.*, 20 units; *Alkalinity*, N/60. Blood taken immediately before injection: *A.T.P.*, 20 units; *Alkalinity*, N/50. Blood taken immediately after injection: *A.T.P.*, 23 units; *Alkalinity*, N/40.	Fluid from œdematous subcutaneous tissue just above level of amputation: *A.T.P.*, 13·3 units; *Alkalinity*, N/80.
15	Amputation stump of upper part of thigh with gas infection of the sloughing surface. An axial incision carried up from this upon ilium. Œdema fluid neutralised by lactic acid gives anaerobically in 4 hours a foaming culture of *B. Welch*. Unneutralised it gives anaerobically a scanty growth in 18 hours. Heart blood obtained 24 hours later at P.M. gives a pure culture of streptococcus.	*A.T.P.*, 16 units; *Alkalinity*, N/35.	Œdema fluid intermixed with blood from incised tissue: *A.T.P.*, 16 units; *Alkalinity*, N/35.
16	Perforating wound immediately below the knee. Limb cold and œdematous. Amputation with view to possibility of gas gangrene infection.	*A.T.P.*, 8 units; *Alkalinity*, N/35.	*A.T.P.*, 4·4 units; *Alkalinity*, N/35.

* The special features of the blood in gas gangrene toxæmia are that the serum is of a characteristic deep yellow colour, there being also, as in most cases of serious bacterial intoxication, a very heavy buffy coat.

relation with the wound, but also in the liver and other internal organs to which the bacillus of Welch may have been conveyed—metastatic growth being favoured as soon as the alkalinity of the blood begins to be reduced by the influx of lymph charged with acid in the infected tissues.

Considerations of this kind should be present to our minds when we turn to take stock of the results of the therapeutic administration of alkalies in "gas gangrene." As shown by the records, this procedure gave markedly favourable results only in two cases out of the six. In those two cases, however, the effect was dramatic. Probably in the other cases, as is the case in the acidæmia of diabetes and uræmia, the evolution of acid must have gone on unaffected.

It must be left for future experimentation to determine whether better results can be obtained by earlier intravenous injection of alkali, and whether the local evolution of gas gangrene could be arrested by the injection into the tissues or, as the case may be, into an infected hæmothorax of alkali or of an *alkalinised* strongly antitryptic serum, remembering here that a strongly antitryptic serum can practically always be obtained either from the patient himself or from any other heavily infected patient.

In concluding, I have to express my acknowledgments to my colleague Major Georges Dreyer for generous assistance in plotting out the curves and in some of the experiments; to my fellow worker the late Captain H. H. Tanner for similar assistance. My thanks are also due to Captain Haycraft for help in connexion with the study of cases of gas gangrene, and to my fellow worker Dr. Alexander Fleming for permission to incorporate in this lecture some of the results of his research work.

ORTHOPÆDIC METHODS IN MILITARY SURGERY.[1]

BY D. McCRAE AITKEN, M.B., CH.B. EDIN., F.R.C.S.

LET me first express to you my appreciation of the honour of giving a demonstration of orthopædic methods in military surgery before this distinguished society. I fear that there must be some lack of continuity in the arrangement of my remarks. In selecting cases for demonstration, I have been guided first of all by the material available in my wards at the Military Orthopædic Hospital. I regret that I have neglected to keep photographic records of many cases which would have been interesting. The consideration, however, which has been most prominent in my mind, is that at no time in the history of this country has conservative surgery been a matter of such vital economic importance.

I have, therefore, selected cases by which I hope to prove that with patient perseverance in gentle methods it is possible to arrive at restoration of function which would be impossible by any violent means of attack, or any direct operative procedure however brilliantly designed. In orthopædic surgery operation is always a mere preliminary to clear the way for educative treatment to restore function; it is not a direct curative measure.

Injuries of the Shoulder.

The first series of cases illustrates the conservation of the deltoid muscle after injury, and the restoration of its function where lost from disuse following severe injury. The line of treatment follows that employed in cases of poliomyelitis or in fracture-dislocation of the shoulder, the guiding principle being that in all serious lesions about the shoulder the abducted position of the arm is a safe position for treatment, though not always the easiest to maintain. For example, we have long known that a shoulder ankylosed with the arm by the side leads to a very useless limb, while if ankylosed with arm abducted, in such a position that with the elbow flexed the fingers come easily to the mouth, the mobility of the scapula is developed so as to make up for the loss of the shoulder-joint. Thus, after ankylosis of the shoulder we have been in the habit of performing a cuneiform osteotomy of the humerus and abducting the arm so as to secure union in the abducted position.

In children full abduction is permissible, for in two or three years they develop an extraordinary compensatory mobility of the scapula. In adults the arm should be raised to rather less than a right angle, otherwise the elbow may not come quite down to the side when the scapula is dropped, and the patient goes about as if he were offering his arm to a partner for dinner, which might be embarrassing.

CASE 1.—I regret that I have no photographs before treatment was commenced. Nov. 19th, 1915: Gunshot wound of right shoulder; suppuration, removal of head of humerus. April 11th, 1916: Admitted five months after injury. No voluntary abduction; wounds not quite healed; scar in muscles firmly adherent to subjacent bone. Passive abduction only 45° without pain. April 19th: Gradual abduction; on abduction splint. (Fig. 1.) July 1st: Lifts arm off splint. (Fig. 2.) August 30th: Discharged; able to put hand to his back collar-stud and brush his hair.

CASE 2.—Sept. 8th, 1916: Fractured scapula, &c. Fracture through spine and body of scapula, septic, patient ill, shoulder dropped. Fractured ends of bone exposed and bare; wound a large round gap. Sept. 18th: Admitted. Elbow supported. Pain relieved by lifting arm and shoulder on abduction pillow in the axilla; at same time gap in scapula closed and bones which were exposed have granulated over. (Photograph shown.) Sept. 22nd: Hæmorrhage. Sept. 23rd: Abduction splint applied (Fig. 3), as it was now more easy to abduct the arm, and the wound was more healthy under irrigation and frequent dressing with hypochlorite lotion.

CASE 3.—April 26th, 1915: Wound of left shoulder. Three operations. Head of humerus removed August 23rd, 1915, as shown in X ray plate. (Fig. 4, skiagram.) June, 1916: Admitted. Put on abduction splint. August 23rd: Can lift arm off splint, but posterior part of deltoid overpowers anterior part. (Fig. 5.) I am trying to devise a light apparatus to hold the butt of the humerus more steadily against the remains of the scapula, so that a fairly efficient false joint may result. As you see in the cast, the upper end of the humerus falls too low in the axilla when the muscles are relaxed.

CASE 4.—August 15th, 1915: Dardanelles. Two operations to remove bone, as shown in X ray. June 22nd, 1916: Admitted. Abduction splint. July 30th: Signs of recovery in deltoid. August 14th: Subperiosteal abscess in upper part of humerus opened and muscle recovery all abolished. (Photograph and patient shown.) This patient is now being kept in the splint to await the results of this inflammatory attack, and I am not curious to know whether he can move the shoulder or not, for even if it result in ankylosis his position is a good one. If I were to move his shoulder before voluntary movement returns I should only do harm.

CASE 5.—Feb. 1st, 1916: Gunshot wound of right shoulder. Sept. 15th: Admitted. No voluntary power in deltoid, as is manifest from the flattened appearance of the shoulder. (Figs. 6 and 7.) Put on abduction splint. (Fig. 8.). You will now see the muscle twitches returning, if you look carefully, when the patient makes a voluntary effort to raise the arm. This returning power is being carefully encouraged by massage, but he is never allowed to lower his elbow, which would stretch the weak muscle and probably paralyse it again by over-stretching it.

Injuries about the Elbow-joint.

Passing next to the elbow-joint, I am tempted to digress first in a little personal history. In 1897–98, when a dresser in the surgical wards in Edinburgh, I was taught that every injury about the elbow, except fracture of the olecranon, should be treated in the fully flexed position. This doctrine had, I believe, been introduced by Caird and Cathcart, who had brought it from Liverpool. The second part of the Liverpool teaching, however, had escaped the Edinburgh teachers, and I look back with horror on the industry with which I performed daily passive movements on an unfortunate child with a split fracture of the condyles of the humerus, with the inevitable result that the joint became more painful and more stiff.

Three years later, when I became house surgeon to Robert Jones in Liverpool, I was taught the doctrine of rest. That is, that having flexed an injured elbow it must be left alone for three weeks or more, till all tenderness about the joint has disappeared. Then, and not till then, the sling may be slackened a few inches; if, two days later, the patient can move the hand through those few inches, the sling may be further slackened. If, however, the elbow become stiff in the new position, it must be again flexed and left to rest for another week or more before again testing it for mobility.

When in 1907 I walked round London hospitals, when I was a candidate for the Fellowship examination, I was surprised, and may I say horrified, to find that the internal right-angled splint was still being recommended for injuries of the elbow. I am still more horrified to find it in use to-day. I know of no injury about the elbow in which the internal right-angled splint can be regarded as a proper splint.

For this strong and sweeping statement there are two good reasons. The first is that the prominent internal epicondyle is pushed outwards, and the line of the elbow-joint distorted if the fracture is through or above the condyles; the second is that even if the epicondyle be to some extent accommodated in a hole in the splint, the forearm is fixed half way between supination and pronation, with the palm of the hand against the splint.

I would lay it down as a standing rule that in all injuries of the arm and elbow, and most of the forearm, the forearm must be supinated and the palm of the hand must be directed towards the face. If this is neglected there will be an error in the carrying angle of the elbow, or there will be limitation of the supination in the forearm, a very serious disability of which we have dozens of examples sent to us in the Military Orthopædic Hospital. I know it is not always easy or possible to attain this, but I am certain that many surgeons are not consciously and deliberately trying to secure full supination in the early stages of treatment.

The next case I show is one of compound fracture immediately above the condyles.

CASE 6.—Sept. 3rd, 1916: Somme; salt pack, No. 5 Rouen. Sept. 18th: Admitted. Wounds pouring pus, and bare bone ends visible. Put on humerus extension splint for irrigation and dressing with hypochlorite solution. Oct. 8th: Wounds granulating, and looking cleaner. Rearranged under anæsthetic and put in flexed position with forearm supinated, and

[1] Demonstration of cases before the Medical Society of London, Oct. 23rd, 1916.

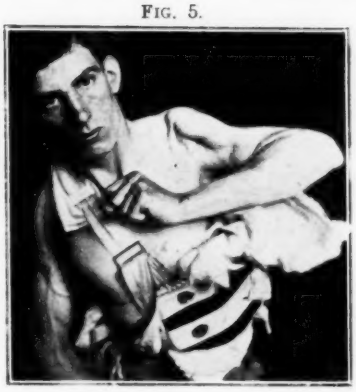
FIG. 1.

FIG. 2.

FIG. 3.

FIG. 4.

FIG. 5.



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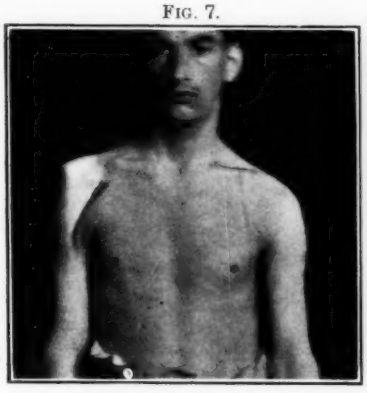
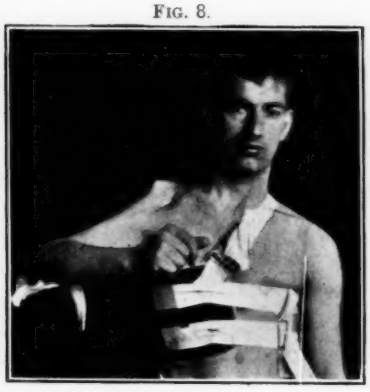


FIG. 8.



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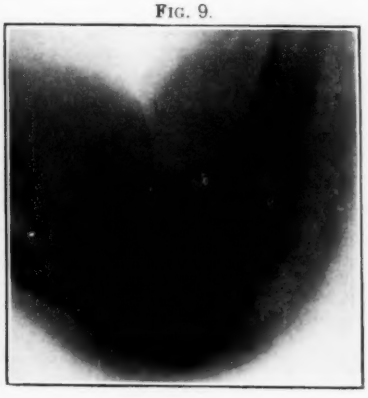
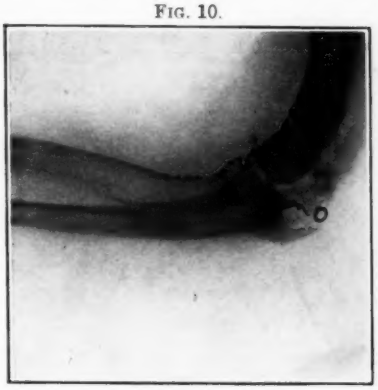


FIG. 10.



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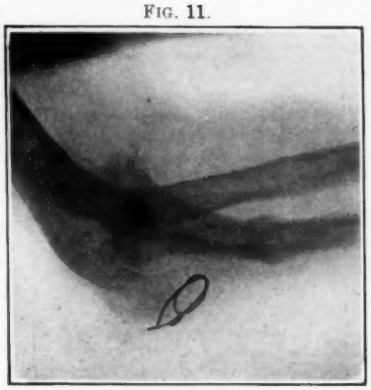

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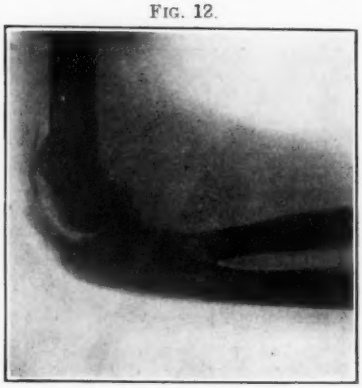

FIG. 13.

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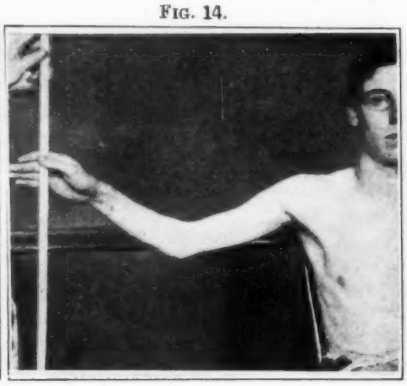

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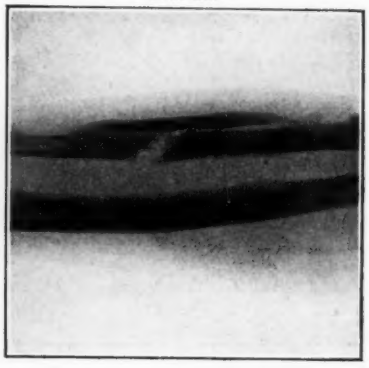

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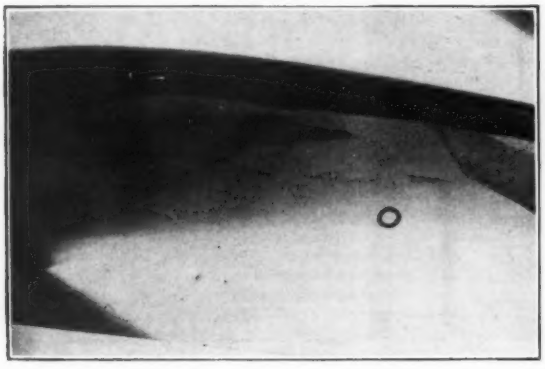

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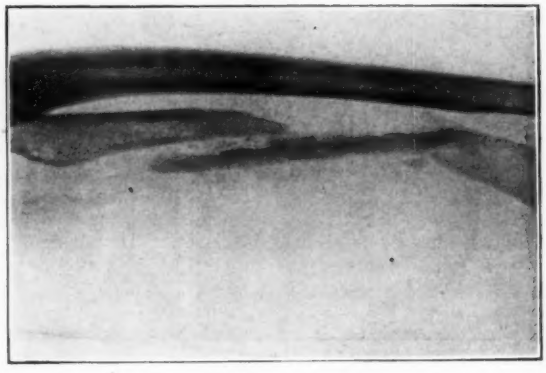

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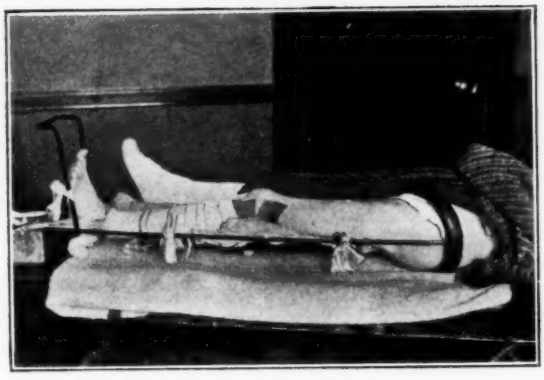

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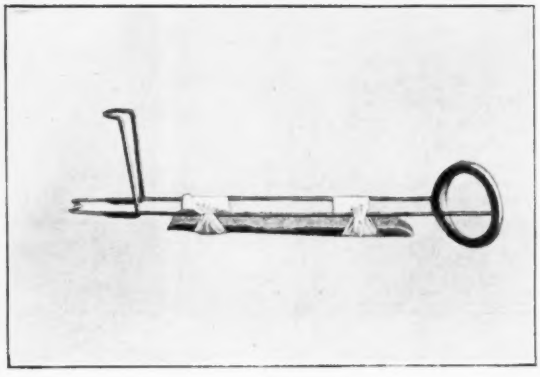

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FIG. 44.

FIG. 45.

wrist slung as he is now (patient shown); next day the X ray you see was taken. (Fig. 9.)

CASE 7.—August 17th, 1915: Gallipoli; operation to remove bone. Later wired; elbow stiff on admission just beyond right angle. May 1st, 1916: Admitted. (Fig. 10.) Wire felt at bottom of sinus and pulled out one day in June when it was loose. July 20th: Sinus healed. The X ray shows the apparently hopeless destruction of the joint. Short sling with rotation turn to supinate forearm. Movement returning as you see (patient shown). One Saturday I got a note from Dr. Mennell, who is in charge of the Massage Department, that he thought we were going too fast with movement, as the range was decreasing; he will therefore have a further period of rest in a short sling.

CASE 8.—Motor-cycle accident. I merely show this case as an example of the conundrums one may have to deal with. Meantime the patient has fallen and broken something loose, and I am having the arm extended in the hopes of reducing subsequent difficulties. The X ray shows the olecranon in position and the coronoid dislocated in front of the humerus, with a fracture of the shaft about 2 inches lower down, which makes manipulation of the upper end practically impossible. (Fig. 11.)

CASE 9.—March, 1916: Shrapnel entered above internal condyle; removed back of elbow. On admission could flex to 45°, extend to 120°. (Figs. 12, 13, and 14.) Has been fully extended once, then flexed for fear of stiffness. The elbow is now being definitely extended, as full flexion was recovered without difficulty after the first gradual extension. The picture shows the method of straightening an elbow (Fig. 15) in a straight Thomas arm-splint. In the patient who is now before you note that in one week, since the photograph was taken, the arm has become quite straight.

Cases Illustrating Points in Treatment.

The next series of cases I am showing because in each I made an error of judgment or in technique. I have learned from them and others may learn also.

CASE 10.—August 10th, 1915: Dardanelles. Developed typhoid 10 days after arrival in England. June 13th, 1916: Admitted with malposition and non-union shown in the picture. (Fig. 16.) Wounds had been healed only three months. As I did not intend to do an open operation, I thought I might risk reducing the deformity. June 26th: Straightened arm manually under anæsthetic. June 28th: Arm swollen, bullæ, wounds broken down and there was profuse discharge of pus. Now ulna united and line straight. Several small sequestra have come away.

CASE 11.—Oct. 13th, 1915: Bullet fractured right ulna. August 1st, 1916: Admitted bone ununited. (Fig. 17.) August 7th: Lateral graft from tibia; broke graft in getting it out, therefore shorter than was planned, as seen in the second X ray. (Fig. 18.) A broad osteotome is essential for picking out graft. The blade should be 2 inches broad. At the time the broadest osteotome available was only 1 inch, hence the accident. Oct. 10th: United: exercise. Now you see the nature of the movements possible. (Patient shown.)

CASE 12.—August 15th, 1915: Dardanelles. Gunshot wound of left arm. Operation at base; later operation to remove dead bone. June 1st, 1916: Admitted. Wounds healed. Defect in radius, as shown in X ray (Fig. 19), of about 3 inches of the shaft. June 19th: Graft from tibia; lower end inserted into marrow cavity, which was a mistake. It should have been inlaid along the lower fragment down to the styloid process. At the time of operation the alignment was good. The way in which the medullary bone has yielded is visible in the X ray (Fig. 20), giving rise to distortion and delay in union. The man can, however, use the hand and movements are improving every week. The flexor of the thumb, which had no origin before operation, is now acting, having taken a new origin from the grafted radius.

Injuries of the Wrist.

At the wrist in most instances stiffness in a flexed position is the fault to be avoided, and dorsiflexion is the first preliminary to any treatment. It is no use wasting time on massage till the wrist has been dorsiflexed. Every school-boy knows that the grip of the hand is weakest with the wrist flexed.

CASE 13.—Jan. 28th, 1916: fracture of right leg; shrapnel wound of left leg; compound fracture of wrist. On admission wrist flexed; could barely move fingers. Injury, fracture of lower end of radius and carpus. Supination very limited. (Photograph and X ray shown.) Oct. 15th: Anæsthetic; wrenched into dorsiflexion with Thomas wrench and put into plaster. Can now move fingers better than before. (Patient shown.)

While the epidiascope is being got ready I shall demonstrate the use of wrench on a wrist.

CASE 14.—Wounded May 3rd, 1915, Cameroons. X rays: (1) at base (Fig. 21), June, 1915; (2) (Fig. 22), August, 1915; (3) (Fig. 23), August, 1916. The treatment was exactly the same, wrenched three weeks ago yesterday. You now see how he can move his fingers independently after three weeks. Before the wrist was dorsiflexed he could barely move them all together at the interphalangeal joints and had no independent movement of individual fingers. The question of making a false joint at the base of the thumb is deferred till the present treatment is completed.

Injuries to the Lower Limb.

In the lower limb the problem of restoration of function is often much more simple than in the upper limb. If a man has a disability which precludes walking any arrangement which makes him independent of crutches is a boon. In my cripple hospital for children I do not think you will find a single pair of crutches. The reason for this is that if a child is allowed to swing along on crutches he will not bother about learning to use his limb properly. The same is in large measure true of the soldier. Unfortunately the hospitals are over-supplied with crutches. It is very difficult to prevent a man from getting hold of them; if he has not crutches of his own he borrows them, and then he does not educate his defective limb as he should.

CASE 15.—Patient came into hospital having had the head of his femur destroyed and removed in 1915. The shaft of the femur telescoped up and down nearly 4 inches and he could only walk on crutches. He was sent out in a walking calliper.

CASE 16.—May 2nd, 1915: Mesopotamia; bullet wound fracture of thigh between the two trochanters. March 16th, 1916: Sciatic nerve explored in New Zealand; Mr. Herbert reported that he could not find any trace of the nerve for several inches. July 20th: Admitted, 14 months after he was wounded. Hip coxa vara deformity shown in X ray and shortening 3¼ inches. (Fig. 25.) Foot in equinus position (Fig. 24); complete sciatic palsy. July 24th: Foot wrenched into right-angled position; subcutaneous division of plantar fascia. August 7th: Osteotomy of femur; extension on abduction splint. (Shown in the paintings.) Oct. 6th: Real shortening about 1 inch; put in plaster. Will soon get up in walking calliper. I have been afraid to trust body weight on the union yet, as the second X ray (Fig. 26) shows there is still a lot of consolidation of bone-tissue to take place. Note the correction of the coxa vara.

CASE 17.—Feb. 15th, 1916: Mesopotamia; bullet wound; fracture in middle of shaft of femur; healed in three weeks. Sept. 5th: Admitted; shortening 2½ inches. (Fig. 27.) Angling both lateral and antero-posterior, as shown in pictures and X ray. (Figs. 28 and 29.) Sept. 8th: Operation; disunion of the callus with chisel; extension on Thomas knee-splint. (Figs. 30 and 31.) Oct. 23rd; Up in walking calliper; shortening ½ inch. Note that there is still an overlap. The shortening found on measurement was due more to faulty alignment than to overlapping of fragments.

CASE 18.—August 23rd, 1915: Thigh shattered below trochanters. August 22nd, 1916: Admitted with malunion shown in pictures. (Figs. 32 and 33.) Sinus only healed three days. Sent out in a walking Thomas splint (Fig. 34) for six months before I dare perform the obvious operation to bring the two parts of the bone in line. By rough measurement there should be less than 1 inch of shortening after operation.

CASE 19.—April 21st, 1916: Bullet through upper part of suprapatellar pouch; no history of fracture sent with the case. May 4th, admitted 13 days later, on a back splint: knee full of fluid. X ray, taken as a precaution before starting movement, showed the fracture. This, of course, made us postpone active walking and movement. (Picture shown.) Note it is a subperiosteal fracture, presumably produced by the expansion thrust of the bullet as it passed. It did not hit the bone.

The next case illustrates the use of the Thomas walking calliper in a case of fibrous ankylosis of the knee in which, although the knee was stiff, there was pain from straining of the fibrous union.

CASE 20.—January, 1915: Bullet entered the back of lower part of thigh; exit through upper part of knee in front. May 20th, 1916: Admitted 16 months after injury. (Fig. 35.) Complete fibrous ankylosis; slight valgus deformity; pain on walking indicated that the fibrous union was being strained. Sent out in walking calliper. (Fig. 36.) To report in six months, when I am quite prepared to find that with a complete relief from all strain the fibrous union has relaxed and a small amount of movement may be present. If that

is the case, I shall then try to increase the range of movement, but the presence of pain indicates that attempts at increasing movement now will only irritate the fibrous tissue and lead to the formation of more dense deposits.

Turner extension splint.—The next two pictures illustrate the use of the Turner extension splint for extending stiff flexed knees. It is of value in cases where the stiffness is due to fibrous deposits in and about the joint and in the muscles. It is therefore particularly applicable in cases where there has been diffuse fibrosis, the result of long-continued sepsis of low intensity. (Figs. 37 and 38.)

Flexion splint.—The next splint I show is one useful for flexing stiff knees where there has been fracture of the femur, and the vasti and rectus muscles are all matted together and to the bone in one solid mass of fibrous infiltration. The splint is applied and the limb very slowly flexed for some days. Then the splint is removed and the limb allowed to straighten. Then the process is repeated, each time carrying the flexion about 5 to 10 degrees farther than the former; and so on for three to five months, when gradually some regeneration of muscle occurs as the cicatricial tissue gets loosened. After this, massage and exercise carry the process farther. The advantage over the McIntyre, from which it is copied, is that the patient can get about in the splint. It is only applicable to old cases with dense fibrosis, and is not intended for recent cases which are amenable to treatment by massage.

The next cases are a series of deformities of the leg resulting from malunion of fractures.

CASE 21.—Sept. 24th, 1915: Fracture of both bones of left leg; many pieces of bone removed. June 7th, 1916: Admitted; wound not healed; foot in extreme position of claw foot and toes also flexed. (Figs. 39 and 40.) June: Foot wrenched into right-angled position and put in plaster. Fig. 41 shows the result. Fracture too firm to yield and too septic to be forcibly dealt with. Oct. 9th: Sequestra removed from the bone.

CASE 22.—July, 1915: Buried in trench by high-explosive shell; multiple fracture of left leg; foot crushed. August 30th: Admitted; leg too straight, does not show the natural bow of the tibia; is therefore a valgoid deformity. Foot had a ridge across the dorsum due to displacement of the bases of the metatarsals. (Pictures and cast shown.) These deformities are well shown in the picture and X ray and cast. August 31st: Foot wrenched to correct displacement of tarsus and metatarsus; put in plaster. Oct. 6th, 1916: Plaster removed; shape of foot much improved, but not perfect; wrenched again; put in plaster, which you now see on the patient and in the picture before you. Note the shape of the foot. There is no evidence of the hump in the plaster.

The next two cases illustrate the method of dealing with the troublesome deformities arising from trench foot. They follow the well-known routine lines of treatment of the acuter forms of flat foot, such as may follow an infective periarthritis, a crush, or the idiopathic forms sometimes seen. In the early stage, when the foot is too tender to touch, the patient is rested in bed absolutely, is massaged daily, and the shape of the feet gradually corrected with some suitable form of splint according to the deformity. When not too tender to be handled, though still too tender for the patient to stand on, the foot is moulded more firmly into correct shape in plaster-of-Paris bandages, and moulded by the surgeon's hands while the plaster is setting. Later the patient is able to get about in a walking plaster, such as those you will see.

CASE 23.—November, 1915: Trench foot; remained in France through the winter; discharged in March, 1916. Sept. 14th, 1916: Admitted; able to stand, but not able to walk much. Right foot is a typical claw foot and the left foot an extreme valgus as shown in the picture. (Fig. 42.) Sept. 20th: Both feet corrected in plaster. Oct. 11th: Plaster removed; right foot recovered (Fig. 43); ordered boot with bar on sole to maintain extension at the mid-tarsal joint. Left foot again put in plaster and will probably be ready in a fortnight for treatment in a boot with the heel raised a third of an inch on the inner side to maintain the inverted position which you see in the picture and in the patient's foot.

CASE 24.—November, 1915: Trench foot. On admission feet almost too tender to be touched; hallux valgus in both feet with the great toe tucked under the second and third. Treatment adopted: (1) Gradually straightened on splints and massage; (2) further moulded in plaster; (3) walking plasters in which you see the patient now. (Picture and patient shown.) Note that the hallux valgus splint has been incorporated in the plaster, as the deformity was tending to recur while the patient walked about in the previous plaster splints. A plaster splint usually gets worn out in three to four weeks, less if the weather is wet, and must be immediately renewed with further correction if necessary, or the case will begin to relapse.

The methods of twisting and moulding a foot by means of plaster bandages are simply an application of familiar methods of correcting club-foot in infants, either with bandages or with sticking-plaster. It is only an application to plaster bandages of methods in everyday use by surgeons who are accustomed to use the direction and tension of their bandages for purposes of correcting or checking deformities. With your permission I will now give you a demonstration of the method with ordinary calico bandages, leaving to your imagination the firm control which can be got by plaster bandages when they set, as is shown in the case before you (Case 25), and in the pictures of the plaster being applied to this case.

The next case is that of a foot which I was urged to amputate on May 4th.

CASE 26.—The patient had been hit by a high-explosive shell on the left foot on April 30th, 1916. He was admitted to hospital on May 4th, 1916, with the forepart of the foot only attached by the soft parts of the sole. The head of the astragalus and the bases of the metatarsals were exposed in the wound. (Fig. 44.) Of the scaphoid and cuneiform bones there only remained a few scattered fragments. The wound surfaces were black and gangrenous and the whole foot extremely septic. The foot was fixed in position in a long crab splint and kept in it with continuous irrigation for several weeks. Formal dressings were only done at intervals; an anæsthetic was necessary on each occasion. Sequestra, of course, have come away on several occasions. I am now able to show you the kind of foot which is resulting from this continuous maintenance of one position. (Fig. 45.) You will note that the tendons are working on the forepart of the foot through the scar.

If I were to allow this patient to be without a splint and let the foot hang on the scar I believe that the scar would become more dense and that this mobility would be lost. In support of this statement I would quote an exactly similar case which was admitted to the hospital early in the spring. There was a similar scar across the dorsum of the foot. The scar was some months old, white, puckered and closely and firmly adherent to the subjacent bone, and there was, of course, no movement in the forepart of the foot in front of the scar. The toes were flexed and rigid and rather puffy. The treatment I adopted was to fix the foot in dorsiflexion in plaster-of-Paris and let the patient walk, the result being that in about two months' time the scar relaxed and the muscles began to act on the forepart of the foot through the scar. It was possible to follow this up by massage and exercise, and the patient left hospital with a shortened but very serviceable foot. I am extremely sorry that I did not keep photographic records of this case, as I consider it one of the most instructive that I have ever had, as it is a direct illustration of the principle that scarred tissue with a strain on it seems to feel a sense of responsibility and becomes hard and tough, while if relieved of the strain of this responsibility it relaxes and allows the muscles an opportunity of showing what they can do.

I trust that the cases I have demonstrated may serve to show that much can be accomplished towards the restoration of function in limbs which at first sight appear to be hopelessly impaired. These results can only be obtained by patience, perseverance, and an unswerving adherence to the plan of treatment without any intermission. The plan of treatment must be based on a firm belief in the principles of conservative surgery and in the value of rest, as first taught by Hilton and put in practice by Hugh Owen Thomas.

Before I sit down let me draw your attention to this old engraving, date 1783. It appears to be a skit on Buzaglo's treatment of arthritis. According to the American Surgeon-General's Catalogue, he published in London a treatise on gout, and was sufficiently famous or notorious to be mentioned in Cruickshank's illustrations of the "Dance of Death." I have never been able to secure a copy of his book. I ask you to note the abducted position for treatment of the shoulder and hip, the right-angled shoe, and the splint in the corner, which is a rough forerunner of the Thomas knee splint. I would like to know more of this Buzaglo and his work, for he evidently knew and practised in 1780 some, at least, of the methods which have been reintroduced by Owen Thomas and Robert Jones and the school of surgeons who follow their teachings, among whom I take leave to include myself.

REPORT ON SIX CASES OF

AMŒBA HISTOLYTICA CARRIERS TREATED WITH EMETINE BISMUTHOUS IODIDE.

BY CAPTAIN C. G. IMRIE, C.A.M.C.,
AND
LIEUTENANT W. ROCHE, R.A.M.C.

(*Report to the Medical Research Committee.*)

THE introduction of emetine in the treatment of amœbic dysentery marked an important advance in the treatment of this disease. In its action on the *Entamœba histolytica* this alkaloid enjoys the rôle of a specific. However, experience has shown that emetine, as it is at present employed, does not always effect the destruction of this protozoon in its encysted stage. Thus, convalescents may continue over a considerable period of time to pass these cysts, which, as we know, are capable of transmitting the infection. From an epidemiological as well as a medical viewpoint the desirability of accomplishing the destruction of the entamœba in the encysted stage is quite obvious.

It has been suggested by Dale that the failure of emetine by hypodermic administration to destroy the cysts of entamœba may be due to the presence of the latter in healed pockets or sinuses, and thus more or less completely shut off from the circulation and tissue fluids of the body, and in support of this hypothesis he mentions the alleged superior efficacy of earlier treatment with ipecacuanha by oral administration. He has introduced a compound of emetine and bismuth iodide for oral administration, with which to obtain the advantages of the ipecacuanha and yet avoid its pharmacological action. He has reported promising results in cases treated with this double salt.

The presence of some cases of amœbic dysentery in No. 4 Canadian General Hospital provided an opportunity to study the action of emetine bismuthous iodide. The observations on which this report is based were made upon 6 cases, all known to be carriers of *Entamœba histolytica* cysts. Of much additional interest is the fact that 4 of these cases had been previously subjected to a course of emetine hydrochloride—daily doses of 1 grain hypodermically for 10 or 12 successive days in this hospital, and notwithstanding this treatment continued to pass cysts in the fæces. The emetine bismuthous iodide was administered in doses of 3 grains on 12 successive nights. When given immediately after the light supper which the patients have at 7 P.M. its administration was always followed with nausea and in some cases vomiting. These undesirable symptoms were least in evidence when the patients received the drug with water at 10 P.M.

In the following protocols tabulated reports of the protozoological findings are given.

CASE 1.—Patient, aged 24, left England in October, 1915. In July, 1916, he was troubled with diarrhœa, which continued at intervals and finally caused his entrance to hospital in August. Received emetine, 1 grain hypodermically, from August 20th to 30th.

Table of Findings.

Date.	Type of stool.	*Ent. coli.*	*Ent. coli* cysts.	*Ent. hist.*	*Ent. hist.* cysts.	*Lamblia.*	*Lamblia* cysts.	Coccidia.
Aug. 8	Brown unformed.	+	+	—	+	—	—	+
,, 17	,,	+	+	+	+	—	—	+
,, 23	Liquid mucus.	—	—	—	—	+++	+++	—
,, 24	Brown unformed.	+	+	+	—	+	++	+
,, 30	,,	+	+	+	+	—	—	—
,, 31*	,,	+	+	—	+	—	—	—
Sept. 2 to 9†	,,	—	—	—	—	—	—	—
,, 10 to 15	With mucus.	—	+	—	—	—	+	—
Sept. 15 to Oct. 14‡ ...	Brown unformed.			—	—	—	—	—

* E.B.I. nightly from Aug. 31 to Sept. 12. † No protozoa. ‡ *Amœba coli* and *Amœba coli* cysts on various days, but no other protozoa.

CASE 2.—Patient in Gallipoli in April, 1915. In July became ill with dysentery and was sent to hospital, where he was treated with emetine. In May, 1916, when in Egypt, had an attack of dysentery, and was sent to a general hospital and treated with emetine. In July, 1916, was admitted to a general hospital in this area.

Table of Findings.

Date.	Type of stool.	*Ent. hist.*	*Ent. hist.* cysts.	—
Aug. 8	Light brown, fæcal and mucus.	+	+	Aug. 6 to 18: Treated with emetine 1 gr.
,, 9	Brown unformed.	+	—	
,, 21	,,	—	+	—
,, 29	,,	+	—	—
,, 30	,,	+	—	E.B.I. daily till Sept. 12.
,, 31	,,	+	+	
Sept. 1 to Oct. 14: No amœbæ or cysts were found in stools which were brown and unformed.				

This patient had also a tetramitus infection which disappeared on Aug. 31.

CASE 3.—Patient had dysentery in Gallipoli in October, 1915; was given 12 to 16 injections of emetine. Admitted to hospital in this area on August 17th, 1916, with diarrhœa.

Table of Findings.

Date.	Type of stool.	*Ent. hist.*	*Ent. hist.* cysts.	—
Aug. 17	Brown unformed.	+	+	Aug. 17 to 29: Emetine hypodermically 1 gr. daily.
,, 30	,,	+	+	
,, 31	,,	+	+	Aug. 31: E.B.I. commenced.
Sept. 1	,,	+	—	
,, 2 to Oct. 14: No protozoa.				—

This patient had a tetramitus infection.

CASE 4.—Patient had dysentery in Egypt in 1915. Had diarrhœa at intervals between January and August, 1916. Admitted to hospital on August 5th with diarrhœa.

Table of Findings.

Date.	Type of stool.	*Ent. hist.*	*Ent. hist.* cysts.	—
Aug. 6	Brown unformed.	+	+	Aug. 7 to 15: Emetine 1 gr. daily hypodermically.
,, 12	,,	—	+	
,, 29	,,	—	+	—
,, 31	,,	—	+	Aug. 31: E.B.I. commenced.
Sept. 3 to 14: No protozoa.				

This patient had a tetramitus infection.

CASE 5.—Patient admitted to hospital on Sept. 14th, 1916. Had no previous history of dysentery, nor had he been in an infected area.

Table of Findings.

Date.	Type of stool.	*Ent. hist.*	*Ent. hist.* cysts.	—
Sept. 15	Fæcal, with little blood and mucus.	+	+	E.B.I. commenced.
,, 19	Brown unformed, mucus.	+	+	
,, 21	Brown unformed.	—	+	
,, 22 to Oct. 20: No protozoa found.				—

CASE 6.—Patient had no previous history of dysentery.

Table of Findings.

Date.	Type of stool.	*Ent. hist.*	*Ent. hist.* cysts.	—
Sept. 25	—	+	—	E.B.I. commenced.
,, 26	—	+	—	—
,, 27 to Oct. 20: No protozoa found.				—

As is shown in the preceding protocols, 5 of the cases ceased to pass *Entamœba histolytica* in the active or encysted form 48 hours after the institution of treatment. The sixth case continued to pass cysts for six days, after which the microscopical findings were negative. These observations have a greater significance when it is remembered that 4 of the cases had previously received a course of emetine hydrochloride, despite which they continued to pass the entamœba in its active or encysted stage. Our observations in these 6 cases confirm the results obtained by Dale [1] and subsequently by Low and Dobell.[2]

The drug was obtained, through the kindness of Lieutenant-Colonel Dudgeon, R.A.M.C., from the Medical Research Committee.

[1] THE LANCET, 1916, ii., 183.
[2] THE LANCET, 1916, ii., 319.

SURFACE-TENSION AND THE WASSERMANN REACTION.

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IN February, 1916, it occurred to me to test the bearing of surface-tension (S.T.) on the Wassermann reaction in view of the fact that S.T. plays an important rôle in adsorption phenomena. This inquiry naturally led on to a further one into the tension-lowering effect of alcohol, which is the main constituent of the antigens used in the test. The conclusions to which I came were as follows: 1. That S.T. is the all-important factor in the Wassermann reaction. 2. That alcohol, bile, carbolic acid, and solutions of cholesterin, which act as antigens in the Wassermann test, all have very low S.T. and greatly reduce the S.T. of serum. 3. That it is difficult to distinguish a syphilitic antigen from a substance which lowers S.T.

These facts are capable of easy verification, but their explanation is a more difficult matter. The question suggests itself: Did Wassermann recognise the S.T. lowering action of alcohol? I think myself that he must have known but intentionally suppressed the knowledge because, the test being founded on the Bordet-Gengou reaction, few would have given credence to it if alcohol alone, or with the addition of ½ per cent. carbolic acid, had been used in place of a specific extract.

In this connexion the history of the test is informing. An extract of syphilitic liver was first used, one gramme of liver being extracted with carbolised saline. Then it was shown that normal liver was as efficient. In each of these cases the best fluid contained bile salts and carbolic acid. As it was found that these watery extracts were unstable, alcohol was added, and it was then discovered that almost any organ of any animal produced an excellent antigen, the reason obviously being that it is the alcohol itself which is the antigen.

The test employed.—For the purpose of my inquiry I followed Fleming's modification of the Wassermann test, previously sensitising the sheep's red blood corpuscles with hæmolytic serum (Allen and Hanburys). The antigen I used as a control was an alcoholic extract of human heart 2 parts and 1 per cent. alcoholic solution of cholesterin 1 part, the procedure being as follows:—

One volume of unheated serum was mixed with 4 volumes of a 1 in 20 dilution of antigen in saline. This was kept at 98° F. for 30 minutes, and then 1 volume of a 1 in 5 emulsion of the sensitised sheep's corpuscles was added and the tubes incubated again for one hour. 1 in 40 and 1 in 80 dilution of antigen were also used in each case so as to determine the degree of reaction. I put up precisely similar tubes, using 95 per cent. alcohol in dilutions of 1 in 20, 1 in 40, and 1 in 80 in place of the extract, and also 95 per cent. alcohol in the above dilutions, plus 1 volume ½ per cent. carbolic acid.

The serum used was from patients with typical syphilis, and the controls were known to be free from syphilis. The experiments were repeated again and again, always with the same result, and lead to the conclusion that 1 in 20 alcohol absorbs alexin from syphilitic serum and not from normal. 1 in 80 alcohol, plus 1 in 1000 carbolic acid, acts in the same way, so that carbolic acid, like cholesterin, increases the antigen power of alcohol, while at the same time reducing the S.T.

The instrument for measuring surface-tension.—A simple definition of S.T. is the force which drives a fluid against gravity up a fine capillary tube. The only text-book methods which I could find for S.T. were based: either on a comparison of the height to which different fluids rise in capillary tubing of constant bore, or on the rate of flow of the different fluids under constant pressure through capillary tubing. Both these methods present practical difficulties, making them inaccurate in my hands and not sensitive enough for the purpose I had in view. It is obvious that the rise of a column of fluid up a very fine capillary tube exerts an easily measurable pressure. All that is necessary is to hold down the fluid with a column of air and measure the pressure required to do so. For this purpose I drew out a stout glass capillary to a fine point and dipped it in the fluid to be tested. The capillary was then connected by a rubber tube with a 4 oz. bottle half filled with water, and closed by a rubber cork with three perforations: one for the capillary connexion, one for a manometer, and one communicating with a rubber ball by squeezing which a pressure could be set up. The manometer was a glass tube graduated in millimetres passing to the bottom of the bottle and, in order to make it more sensitive, bent at an angle of 45°, thus increasing the length of the column of water denoting a particular pressure. A typical experiment was conducted thus:—

The capillary point was made to dip in distilled water. The rubber ball was squeezed, and water from the bottle rose in the manometer to 800 mm. A clip was applied between the rubber ball and the bottle to maintain the pressure. Air bubbled out of the fine capillary opening through the distilled water, while the water level in the manometer gradually sank till the escape of air from the fine point ceased. The water in the manometer now stood at 700 mm. Absolute alcohol was now substituted for the distilled water. Bubbling at once recommenced, and the manometer sank to 70 mm. The S.T. can now be stated as the ratio between the manometer reading for water and the reading for alcohol.

The following liquids were also tested and found to possess low S.T.: ether, xylol, benzene, petrol, petroleum, peppermint oil, and nitric acid. Solutions of sodium chloride and sodium citrate in water raised the S.T. a little, while sodium salicylate (belonging to the carbolic group) reduced it.

A further useful application of this simple apparatus is that by estimating the S.T. of dilutions of alcohol, carbolic acid, &c., it provides an accurate method of determining the percentage composition of such solutions. The presence of sugar does not impair the accuracy of the determination which therein possesses a great advantage over the hydrometer.

I am informed that an apparatus on similar lines has been used in alcoholmetry, but I have not seen it, nor read an account of it. I showed my apparatus to Colonel Sir W. Leishman, Colonel F. R. Ozzard, I.M.S., Major W. E. McKechnie, I.M.S., to all of whom it was a novelty, and I was under the impression at the time that I was the first to use this principle. I believe that it will have an important application in the detection of adulterations, and that it will become the rule to state the S.T. when describing a liquid or salt solution.

Clinical Notes:

MEDICAL, SURGICAL, OBSTETRICAL, AND THERAPEUTICAL.

NOTES OF A CASE OF

TRAUMATIC HERNIA OF THE DIAPHRAGM PROVING FATAL SEVEN MONTHS AFTER THE WOUND.

BY C. P. SYMONDS, M.R.C.P. LOND.,
TEMPORARY CAPTAIN, R.A.M.C.

ALTHOUGH in this case the rent in the diaphragm was so large that nothing could have been done to repair it, it is possible that such cases may occur again and that an earlier diagnosis might enable the surgeon to operate with some hope of permanent relief.

Private ——, of the S.A.I., aged 29, was admitted to the Connaught Hospital on the afternoon of August 31st, 1916. He had had no previous illness and had led a vigorous and healthy life. In February, 1916, while fighting against the Senussi, he was hit when stooping forward, so that the bullet, entering over the left scapula, apparently came to rest in the subcutaneous tissues of the abdominal wall in the left hypochondrium. He was taken to a dressing station where he vomited some blood, and subsequently to a base hospital at which an operation was performed on his abdomen and he believed the bullet was removed. Both wounds were healed in ten days; he was kept in bed for five weeks, became restored to full health and was eventually discharged to duty.

About six weeks after the original wound he had his first attack of abdominal pain; it was very slight. Subsequently he had many such attacks, three or four a month; although more severe latterly he had not felt ill enough to report sick. The attacks were nearly always preceded by constipation; he then had a premonitory feeling of uneasiness in the abdomen, and if he could now get his bowels to open well could sometimes avert the attack. The pain came on after or half-way through a meal and would pass off in a few minutes, being

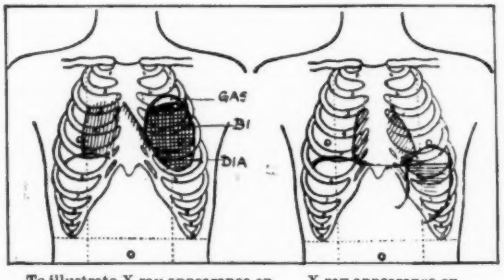
relieved when he lay on his right side; while it lasted it was very severe, but in between the attacks he felt quite well, though he thought his wind was not as good as it had been.

He was admitted in what he described as a typical attack, but much more severe than any before experienced. His bowels had not been open for two days, and then half-way through breakfast had come on the pain; he vomited the food just taken, but with no relief. On examination he proved to be a well-developed man of normal physique; over the centre of the spine of the left scapula was the scar of the entrance wound; in the middle of the left hypochondrium was a healed two-inch linear incision. He complained of a dull continuous pain across the upper abdomen, to which were added occasional paroxysms of agony, during which he turned pale and cold and broke out into a sweat, while his pulse was small, slow, and irregular. The position he adopted during these paroxysms was very striking, sitting bolt upright with his knees huddled up to his chin, the slightest attempt at straightening the back being intolerable.

On inspection and palpation the left hypochondrium appeared emptier and the left thorax fuller than on the other side. The physical signs in the chest resembled those of a hydropneumothorax. The right border of the heart was 2½ inches to the right of the sternum; the apex beat was not palpable, but was best heard in the fourth left space close to the sternal margin. At the apex of the left lung the percussion note was of a higher pitch than at the right, and the breathing was bronchial. But from the second space downwards the note was tympanitic all over the cardiac area and continuous with the stomach resonance. There were no breath sounds over this area, but with the patient in the sitting position curious tinkling sounds were audible in the third space. The signs at the back were similar, and bell sounds with coins were easily demonstrated.

The true diagnosis did not strike me at the moment; I thought the dilated stomach was pushing up the diaphragm. But in a quiet interval between two paroxysms I gave the patient 3 ounces of bismuth carbonate, and with the help of Captain F. S. Hawks, radiographer to the hospital, examined him with the screen. The horizontal position was the only one available, but the picture obtained was quite definite. (Fig. 1.)

FIG. 1. FIG. 2.



To illustrate X ray appearance on Aug. 31st. DIA, Diaphragm.

X ray appearance on Sept. 19th.

All the bismuth was contained in the stomach, which reached up to the second left rib in front, and above it could be seen the dense compressed lung. The time for observation was limited, for a paroxysm of pain compelled the patient to revert to the sitting position; but Captain Hawks was able to see a fine shadow to the left of the lower end of the stomach, having a slight vertical movement with respiration, which he took to be the diaphragm. The diagnosis of diaphragmatic hernia was now made. Most of the bismuth was removed by means of a stomach-tube and evacuator, but this gave no relief.

Two doses of gr. ¼ of morphia were given in the night and the patient had a little sleep still in the sitting posture, and as his general condition was better he was transferred early next morning to the care of the surgeons at the Cambridge Hospital. Here his condition rapidly improved, the pain disappeared, and in a few days he was able to take his food without discomfort.

Through the courtesy of the officer commanding the Cambridge Hospital and the officers in charge of the case I was able to see the patient again 19 days later. No operation had been performed and he was apparently in normal health. Physical examination showed the stomach resonance to reach the fourth rib, and the heart was a little displaced to the right. This was confirmed by X ray examination in the vertical position. (Fig. 2.) The left dome of the diaphragm showed as a clear, thin line, with no breach in its continuity; the stomach lay below it, and the picture was apparently that of distension of this viscus with consequent stretching of the diaphragm. There can be no doubt, however, that the correct interpretation of this picture was that the surface area of the diaphragm was increased and its contractile power diminished by reason of the large gap in its substance which was subsequently discovered, and that the high position of the stomach with displacement of the heart was consequent upon this. There was now some debate as to the validity of the original diagnosis. Those who opposed it brought forward the argument that the bullet, if it had indeed passed through the diaphragm, must have damaged the scapula, of which a plate was produced showing no evidence of injury; moreover, that continuing its course it could hardly have failed to pierce the heart and so cause death. Subsequent events showed the fallacy in any argument based on the theoretical course of a modern bullet between wounds of entrance and exit.

A fortnight later the patient had another attack of abdominal pain; operation was performed and the hole in the diaphragm found, but his condition was desperate and he subsequently died of shock. At the post-mortem a large circular opening with quite smooth and rounded edges was found near the centre of the left dome of the diaphragm which would admit of a medium-sized hand being passed into the thorax, in which were contained the stomach, great omentum, transverse colon, and the upper half of the small intestine, the last being kinked in several places, distended, and of a deep plum colour. The stomach reached as high as the second rib and was partly adherent to the chest wall; the apex of the heart lay just to the left of the sternum. Finally, the expanded copper casing of a rifle bullet was discovered in one edge of the wound of the diaphragm, but no trace of the leaden core was found; presumably it was that which had been removed from the abdominal wall.

A remarkable point about this case is the length of the history. The wound in the diaphragm must have existed from the first, and apparently the increased intra-abdominal pressure resulting from constipation was the occasional cause needed to force a knuckle of stomach through the opening. The contractions in this knuckle set up by taking food then caused the agonising pain, partly relieved only by the crouching position, in which the tension of the diaphragm was reduced to its minimum. To this was added the continuous ache, probably due to the drag of the stomach and other viscera upon their peritoneal attachments. Up till the attack in which I first saw him spontaneous reduction must have occurred quite easily on every occasion, and eventually happened even after the stomach had been above the diaphragm for at least 24 hours. Of the symptoms when the patient was first seen, the most important features were the presence of gastric distension and abdominal pain *without* vomiting, the fact that the condition was not relieved by the passage of a stomach-tube, and especially the posture adopted.

I am indebted to Lieutenant-Colonel W. Turner, officer commanding the Connaught Hospital, for permission to publish this case.

Aldershot.

A NOTE ON THE BLOOD CHANGES IN GAS POISONING.

BY JAMES MILLER, M.D. EDIN., F.R.C.P. EDIN.,
CAPTAIN, R.A.M.C. (T.);
AND
HARRY RAINY, M.A., M.D. EDIN.,
CAPTAIN, R.A.M.C. (T.)

WE venture to draw attention to a point which appears to be of some interest, and possibly of importance, which has recently come under our notice as the result of differential blood counts in cases of gas poisoning. We have not yet examined any very large number of cases, but we are extending our observations, and hope to publish them in detail at an early date. We have made inquiries and have looked up some of the literature—e.g., the Memorandum on Gas Poisoning in Warfare, with Notes on its Pathology and Treatment—and have failed to find any similar observation.

We append a table of a series of 14 cases taken at random, an analysis of which appears to bring out the following facts: 1. A case which has been gassed sufficiently severely to produce symptoms lasting for some time shows a more

or less marked relative lymphocytosis. 2. This change in the blood takes some time to develop. Probably three to four months at least must elapse before the change appears, but once it develops it does not disappear for some time, apparently for at least a year, if symptoms of any kind persist.

No.	Leucocyte count.	Polymorphs.	Mononuclears.	Lymphocytes.	Eosinophiles.	Mast cells.
	per c.mm.	%	%	%	%	%
1	5700	50·2	4·6	40·8	3·4	0·8
2	—	53·19	5·5	40·0	0·4	0·8
3	5968	47·6	2·6	44·6	1·8	1·8
4	6570	33·5	3·7	60·0	1 0	0·7
5	—	58·2	2·8	33·4	4·6	0·9
6	6570	51·2	1·4	45·2	2·2	—
7	7812	58·5	3·8	35·04	2·5	—
8	—	37·5	3·2	56·3	2·6	—
9	6562	39·9	4·3	51·7	3·2	0·8
10	8124	62·3	4·3	30·2	1·2	1·9
11	7184	72·1	2·5	23·4	2·0	—
12	9686	75·7	1·2	21·7	1·2	—
13	5000	35·3	2·7	58 2	3·2	0·2
14	8122	47·9	2·4	47·6	0·3	1·5

Note.—The results represent an analysis of 300-500 leucocytes, and in several instances the counts were repeated on more than one occasion and by more than one observer.

Remarks.

1. Gassed June, 1916. Helmet was blown off, and he lay in a wounded condition exposed to gas-shell attack. Nausea the only after-symptom
2. Gassed June, 1916. Marked symptoms. Discharged from Army as result (September, 1916).
3. Gassed September, 1915. Marked eye symptoms and tremors still present.
4. Gassed April, 1916. Fairly severe, cannot march any distance. Tremors.
5. Gassed Sept. 25th, 1915, very slight, did not report sick, no symptoms now.
6. Gassed September, 1915. Suffers still from eye symptoms and tremors.
7. Gassed July, 1916. Exposed for a short time, no symptoms.
8. Gassed September, 1915. Buried near a burst cylinder. Unconscious for four hours.
9. Gassed October, 1915. Exposed for 20 minutes, dazed, cough for three months.
10. Gassed September, 1915. Very slight, no after effects.
11. Gassed December, 1915. Very slight, no after-effects.
12. Gassed July, 1916. Rendered unconscious, suffers from cough, tightness in chest.
13. Gassed April, 1915. In hospital at the time. Hospital blown up. Unconscious for a few hours. Cough, shortness of breath, and nausea.
14. Gassed September, 1915. Unconscious for four days. Intense nausea, and vomiting for several days. No cough.

We are not able to state whether this sign is present in all types of gas poisoning or only in certain of them, because it is a difficult matter to obtain any definite information on this point from the patient himself. As regards the number of the leucocytes per cubic millimetre there does not appear to be any marked change, if anything there is a slight reduction.

Dr. H. Fielden Briggs has been elected by the dental practitioners of the Transvaal to represent them upon the Transvaal Medical Council.

THE LATE DR. P. G. BORROWMAN.—In Philip Grierson Borrowman, who died at the age of 62 on Dec. 17th last after a short illness, the profession in Edinburgh has lost a much respected member. Though subjected during much of his professional life to the restrictions of ill-health, Dr. Borrowman had a large and varied experience of medical work in many spheres, having practised in Earlston, Colombo, Elie, Crieff, Troon, and latterly, for six years, in Edinburgh. He also found time to make a number of short practical contributions to medical journals. In his later years in Edinburgh his health improved considerably, and in addition to his practice he has had recently the satisfaction of taking work for younger men who have gone abroad and of doing a certain amount of war service of various kinds, besides holding the post of surgeon to the mounted constables. He has left a widow, two sons, and a daughter. Of his sons one is a minister of the Church of Scotland, the younger is an officer in the Indian Army; both are on active service.

Reviews and Notices of Books.

Medical Diseases of the War.

By ARTHUR F. HURST, M.A., M.D.Oxon., F.R.C.P.Lond., Temporary Major, R.A.M.C.; Physician and Neurologist to Guy's Hospital; Neurologist to the 3rd Southern General Hospital: lately Member of the Medical Advisory Committee, Mediterranean Expeditionary Force, and Consulting Physician to the Salonica Army. London: Edward Arnold. 1917. Pp. 151. Price 6*s.*

THIS is an opportune and admirable book.

The first of the ten chapters is on functional nervous disorders, and contains an interesting account of shell shock. Some stress is laid on the initial minute changes in the central nervous system as forming the organic basis for the symptoms which persist and become exaggerated from psychical causes. No definite line can be drawn between cases with obviously organic symptoms and those with obviously hysterical manifestations due to auto-suggestion, and many intermediate cases occur. For the hysterical symptoms hypnotism is eminently successful, and everyone in charge of the neuroses of soldiers should be capable of carrying out this method of treatment. In Chapter II. the various forms of dysentery are clearly described. With regard to the presence of *Lamblia intestinalis* in the stools it appears that importance should be attached to them only when there are concomitant symptoms. It is remarkable how few cases of amœbic hepatitis and hepatic abscess have been recognised. In patients with bacillary dysentery who have previously had antitoxic serum for other diseases, or who suffer from asthma, the danger of anaphylaxis can be obviated by subcutaneous injection of 1/10 c.c. of the multivalent serum before intramuscular injection of 20 c.c. of the serum. In ordinary cases the serum is given intravenously so as to ensure the most rapid neutralisation of toxins by the antibodies. War nephritis and both forms of trench fever were seen at Salonica, where the available evidence confirmed the opinion formed in France that trench fever is spread by lice. It was not possible at Salonica to distinguish clinically between paratyphoid A and B, and there was no real difference between the severity of the two forms.

Epidemic jaundice is dealt with under two heads: (1) Among the Mediterranean forces, due to an infective duodenitis; (2) in France, due to *Spirochæta ictero-hæmorrhagica*; as this disease was previously described by the French the author urges that the term "Weil's disease" should lapse. In practice, however, the title spirochætosis ictero-hæmorrhagica is so unwieldy that unless some shorter and distinctive name is forthcoming it seems to us unlikely that the enemy name will permanently fall out of use. It is also, perhaps, open to question if all the cases of jaundice on the Western front were of the same nature, especially as the mortality (6 per cent.) was so much lower than that of spirochætal jaundice in Japan and Egypt (30 per cent.). Dr. Hurst considers that beri-beri as seen at Gallipoli was due to a duodenal infection, similar to that described in 1905 by Hamilton Wright, and that though the anti-beri-beri vitamine was probably a contributory factor it was not the sole cause. It is significant how frequently this form of peripheral neuritis followed jaundice, and an apt comparison is drawn between this sequence and that of diphtheria and paralysis.

Under the etiology of the soldiers' heart the claims of intoxications, over-exertion, and nervous strain are clearly discussed; and in regard to the first it is pointed out that as over-activity of the thyroid is more easily detected than that of the other ductless glands, this form of cardiac disease has been called hyperthyroidism, but that there is really a disturbed activity of all the ductless glands. In this form of soldier's heart, due to a "vegetative neurosis," the blood pressure is raised, in contrast to its low level in the other forms, and this is regarded as evidence against simple hyperthyroidism, the author stating that in uncomplicated Graves's disease the blood pressure is not raised—a conclusion on which there is, perhaps, room for discussion.

The sections on the various diseases are well written, are in due proportion to their interest and importance, and should ensure a second edition at an early date, when perhaps some further chapters might be added.

The Treatment of Infantile Paralysis.

By ROBERT W. LOVETT, M.D., Boston. London: William Heinemann. 1916. Pp. 163. Price 8*s.* 6*d.*

As the title of the work indicates, it deals chiefly with the treatment of the affection, but there is a short introductory chapter on the pathology, symptoms, types, mortality, diagnosis, and prognosis of the disease. With regard to the mortality, it is interesting to note that in no instance did it reach the high percentage recorded in the American epidemic of 1916. The author asserts that complete recovery without atrophy occurs more frequently than is generally thought, and quotes figures from the Massachusetts epidemic showing that it amounted to 27 per cent.

The treatment is described in four chapters, that of the acute phase, the convalescent phase, the chronic phase, and operative treatment. In regard to the acute phase, the author sums up the treatment with these words, "Rest until the tenderness has disappeared, absence of meddlesome therapeutics, either medicinal or physical, the use of warm baths in the later part of the period, and the prevention of contraction." The treatment during the convalescent phase consists in teaching the patient to walk, the prevention of deformity by the use of instruments, and the application of massage, heat, electricity, and muscle training. To this latter the author devotes a special chapter, giving detailed instructions of the position in which the limb should be placed in order to bring into action individual muscles. This is probably the most important chapter in the book, and the author acknowledges the aid he has received from his assistant, Miss Wright, in this matter. The numerous deformities liable to occur during the course of the disease are described and figured, and the various methods, both instrumental and operative, are discussed. The final chapter deals with "muscle test," a test by which under conditions of constant position and leverage, by a series of spring balance pulls, the power of the muscles which govern the movements of the limbs can be registered.

The book is well illustrated with photographs and diagrams of the procedures for dealing with the many conditions of muscular weakness and deformity caused by poliomyelitis.

Medical and Veterinary Entomology.

A Text-book for Use in Schools and Colleges, as well as a Handbook for the Use of Physicians, Veterinarians, and Public Health Officials. By WILLIAM B. HERMS, Professor of Parasitology in the University of California. New York: The Macmillan Company. With 228 illustrations. Pp. 393. Price 17*s.* net.

THE author of this book has done good service in bringing under one cover the widely scattered literature of medical and veterinary entomology. He has not rushed into print, for he states that he has spent six years in gathering information and making investigations and observations in this special field. The result appears to justify his labours. The subject-matter is well arranged; the illustrations, many of which are original, are apt and good, and the whole field of prevention of disease due to insects is effectively covered. We think the author is at his best in the chapters on mosquitoes, the common house-fly, and the control of rats and rat-fleas. He describes the extermination of bubonic plague in the city of San Francisco by measures dealing with the last-named pest. He regards the cockroach as a possible carrier of tuberculosis, dysentery, cholera, and typhoid fever. The life-history and habitat of the various pests are dealt with in chapters on cockroaches, beetles, lice, bugs, mosquitoes, house-flies, blood-sucking muscids, flesh flies, fleas, ticks, and mites, and the book concludes with an interesting chapter on venomous insects and arachnids. It will form a welcome addition to the library of the sanitarian and epidemiologist.

LIBRARY TABLE.

Paton's List of Schools and Tutors, 1917. London: J. and J. Paton. Pp. 999. Price 2*s.*—This is the nineteenth annual issue of a thoroughly useful publication and does not differ in arrangement from the immediately preceding issues. We have, first, a classified list of schools, comprising an index of preparatory and other schools for boys and girls in the three divisions of the United Kingdom. Lists are also given of prizes and scholarships at the various schools, as well as of special schools and training colleges for technical instruction. Where possible, full information in respect of fees is appended. Useful little essays will also be found on the education necessary to obtain Civil Service appointments, military and naval commissions, and commissions in the mercantile marine, while the portals of the professions of architecture and medicine are examined. The essay on the entrance to the medical profession is a particularly sensible one; it gives to the lay parent the necessary information in a popular form.

The Passing On of Life: A Talk about Ourselves. By the Viscountess FALMOUTH. London: George Routledge and Sons, Limited. 1916. Price 1*d.*—This tract on the reproduction of the human species is a section of the author's "Talks about Ourselves: Simple Teaching in Hygiene and Physiology," which has been extracted from the book and enlarged to make its message clearer. It is a complete estimate of the pamphlet to say that on a very difficult and delicate subject the message is perfectly clear. Lady Falmouth follows lines that have been followed before, in preparing the minds of the juvenile readers for whom she writes, when she begins by an explanation of plant fertilisation. A sketch of bird life follows and introduces us to cattle-breeding and its eugenic theories, before the sex question as it affects the human race is actually touched upon. Here, taken with all that has preceded, quite enough is taught, and the religious tone of the passages which inculcate the value of self-restraint and the influence of right thinking is impressive in its direct simplicity. The dissemination of this unpretentious tract should be very valuable, especially at a time when the absence by over-employment of many parents makes the up-bringing of children difficult if they are to be kept in the right way.

The Greek Tradition: Essays in the Reconstruction of Ancient Thought. By J. A. K. THOMSON, M.A. London: George Allen and Unwin, Limited. Pp. 247. Price 5*s.* net.—Mr. Thomson's book is a further development of his Studies in the Odyssey, and will be a revelation to all whose acquaintance with the classics has been in the nature of a mechanical task or a form of educational gymnastics. Not merely do the characters live, but the author's lively and instructed imagination has reconstructed a background of contemporary colour which makes the whole topical. We commend the book to all those to whom ancient Greece has hitherto been a sealed book.

MISCELLANEOUS VOLUMES.

A SERIES of handbooks is now being issued, under the common title of Mind and Health Series (London: William Heinemann. Price 5*s.* net each). The wish of the editor, Mr. H. Addington Bruce, is to extend a popular knowledge of such developments of psychological research as bear more obviously upon social and individual welfare. The first four volumes deal with the investigation of what is known as the "subconscious territory of the human mind," an attempt being made to explain the way in which mental processes are carried on behind or beneath consciousness, and to estimate how far these processes affect what is generally termed the character of the individual, as illustrated by motives and behaviour. A whole literature of a quasi-scientific or quasi-medical character has grown up of recent years in this direction, but these small volumes are intended rather as a recognition of the demand made by teachers, parents, and other responsible citizens for instruction.

The opening volume, "Human Motives," has been written by Professor James Jackson Putnam, emeritus professor of diseases of the nervous system at Harvard University and a highly esteemed worker in the field of medical psychology; it has a more general character than the other volumes of the series so far issued. The attempt is made within a very brief compass to erect a practical philosophy of life for the assistance of the teaching of modern psychology. Finding in nature two sets of motives behind action—namely, those promoted by love of humanity and freedom, and those unconsciously entertained, being legacies from forgotten portions of life and experience—Professor Putnam urges that real self-knowledge must follow the discovery of how much the first set of motives are influenced by the second. From a description of the main sources of motives he passes naturally to consider not only the bearings of psycho-neuroses and the development of consciousness, but also religion, when regarded as a standard of motives.

He presents the reasons why an industrious psychological worker finds his religious convictions to have been strengthened by his experience.

In the second volume of the series, "The Meaning of Dreams," Dr. Isador H. Coriat, assistant physician for nervous diseases to the Boston City Hospital, surveys the principles of dream-analysis along the lines formulated by Freud. Freud's work in this direction he describes as one of the greatest advances ever made in the knowledge of human mind and human motive. The examples of dream-analysis contained in the book follow methods well known to our readers, who will not with any unanimity be prepared to endorse the views expressed. The general editor of the series is on safer ground in "Sleep and Sleeplessness," wherein the various theories of sleep are exposed, prominence being given to recent experimental studies in the attempt to illustrate the causes and treatment of sleeplessness, as well as to discuss the apparent relationship of dreams with what is called the "supernatural." The theories quoted are not all of equal scientific standing, nor will all the stories emerge with equal credit from minute examination, but this is a very interesting little book. Dr. Dearborn strikes new ground in the fourth essay, "The Influence of Joy," which purports to be an account of modern methods of research into the specific effects of joy and other emotions. "The scientific economics of joy and happiness"—this is exactly what he writes—"remains to be developed, and our thesis insists that it is developable. In other terms, joy has an evaluation (even if not yet in figures) in State Street on the bulletins of the Stock Exchange; in the concrete-and-glass factory of Mr. Shoemaker; among the maids in your home; in the coal-mine; aboard ship; in your own private accounts which you keep to satisfy the income-tax collecter. Daily joy has money value as well as soul value, even in the manual trades. And soon some man (or, more likely perhaps, some ingenious woman economist) will begin to reduce it to grades, to 'standardise' it and to find its mean financial value to all sorts and conditions of workers." We learn from this book the close connexion between happiness, or at any rate content, and high working efficiency, but it is doubtful whether a treatise required to be written in order to prove that the emotions of happiness stimulate the bodily functions and cause thereby a more satisfactory output of effort with correspondingly good results.

All these books are laudable in their endeavour to make the public free of information in directions where its supply might lead to an improvement of morals, or the erection of needed standards of conduct. Further, if the teaching is often sketchy and the meaning of the authors thereby obscured, we must remember the difficulties of the attempt to translate into simple terms the conclusions of complicated thinking. But there is no note taken of the difference between scientific literature and pretentious jargon, or between real and imitation scientific procedure, so that questions that perplex many thoughtful persons remain without trustworthy answer. To cite Sigmund Freud's revolting work is not to enunciate the accepted truth, even if the German psychologist is not so wholly obsessed by sex questions as he appears to be; and some of the other writers quoted as authorities can have no authority whatever.

Dr R. W. MacKenna's book (*The Adventure of Death*) London: John Murray. 1916 Pp. 168 Price 3*s.* 6*d.* net) covers certain extent ground that passed over by the volumes in the Mind and Health Series. He has considered the subject of death from different points of view, not necessarily the obvious ones, and the result is an essay of a really inspiriting sort. Fear he finds to be absent from most death-beds, and pain to be quite unusual at the end, however bitterly it may have accompanied the earlier stages of some diseases. A short chapter enumerating what life gains from death exemplifies well the words of Robert Browning, which are quoted by the author in this connexion:—

> You never know what life means till you die.
> Even throughout life, 'tis death that makes life live,
> Gives it whatever the significance.

Dr. MacKenna utterly discredits the materialistic school, and finds on every side that man is more than matter and that personality survives the grave. At a time like this, when millions are facing sudden death daily, and when their parents and wives, children and friends, are filled with apprehension of their fate, this fine little essay may prove a consolation with a wide message.

Reports and Analytical Records
FROM
THE LANCET LABORATORY.

EUCALYPTOL (CINEOL).

(HUDSON'S EUMENTHOL CHEMICAL COMPANY, LIMITED, SYDNEY, AUSTRALIA. LONDON AGENCY: F. NEWBERY AND SONS, LIMITED, 27 AND 28, CHARTERHOUSE-SQUARE, LONDON, E.C.)

AN examination of this brilliantly clear colourless oil gave indications of a very high eucalyptol or real cineol content. Thus its specific gravity was found to be 929·5, whereas the oils showing a small proportion of cineol have a decidedly lower density. In fact, we have not examined a eucalyptus oil showing a higher density than is here recorded. We understand that the oil has been prepared by a freezing separation method. We found that its boiling point lay between 165 and 170° C. There were just traces of moisture present. An oil showing these constants should be well adapted for medicinal purposes. It is free from irritating constituents such as aldehydes and can be inhaled without causing coughing. It is noteworthy that eucalyptus on oxidising in contact with the air produces a fair amount of ozone.

"SMALL TEA."

(BROOKE BOND AND CO., LIMITED, GOULSTON-STREET, ALDGATE, LONDON, E.)

We have already reported in these columns upon a sample of what is called "small tea," which is stated to consist only of the fine part of the leaf edge. On analysis a five minutes' infusion of this tea showed a proportion of caffeine to tannin of 1 to 3 (caffeine 2·7 per cent., and tannin 8·0 per cent.), and when this result is obtained by chemical analysis the tea proves invariably to be of a good dietetic character, free from excess of tannin and from excess of caffeine. The alkaloid, in fact, is presented in the form of a neutral tannate. We have received a further sample which is described as being of a still higher quality. We found that it produced an infusion (five minutes) smooth, soft, and delicate to the palate, and, again, analysis showed that the caffeine was present in the proportion of 1 to 3 of tannin. The conclusion seems to be confirmed that harsh, astringent or bitter teas owe their properties to, on the one hand, an excess of tannin present, or, on the other, to an excess of caffeine. The ratio is correct in the tea under examination, showing that in a five minutes' infusion caffeine-tannate is extracted, but neither free tannin nor caffeine. The result is a beverage that does not disturb the digestion.

"SOLOID" NASO-PHARYNGEAL (EUCAINE) COMPOUND.

(BURROUGHS, WELLCOME, AND CO., SNOW HILL BUILDINGS, LONDON, E.C.)

This soloid is useful in the treatment, by a gargle or spray, of irritable conditions of the nose and throat. It contains, amongst other things, well-known antiseptic essential oils besides boric acid and sodium benzoate. The formula has been recently modified by replacing cocaine salt with eucaine hydrochloride. For the treatment of the nose and throat one soloid is dissolved in three ounces of water. A solution of two soloids in ten ounces of water has been found very useful as a lotion in conjunctivitis.

"DIAL-CIBA."

(THE SACCHARIN CORPORATION, LIMITED, 36 AND 37, QUEEN-STREET, LONDON, E.C.)

The above is the short name given to an important barbituric acid derivative. It is, in fact, di-allyl barbituric acid or di-allyl malonyl urea. The ethyl group in veronal is replaced by the allyl group; this is said to give it important advantages. Thus whilst a powerful hypnotic, it is held to be less toxic and to produce no unpleasant after-effects. An interesting point in regard to its administration is that whereas diethyl barbituric acid is recoverable to a large extent from the urine as such, di-allyl barbituric acid breaks down into simpler bodies. These are important claims, and the new derivative is worth some attention. It furnishes an interesting example of the relation of chemical constitution to pharmacological action.

THE LANCET.

LONDON: SATURDAY, JANUARY 6, 1917.

An Ideal for the New Year.

THE New Year finds the medical man bearing his share of the war burden—a burden not exactly comparable to that borne by his fellow citizens. To every other man of military age, with but trifling exceptions, the call has come to train himself either to fight or to keep the fighting machine in full efficiency, his previous occupation having not necessarily been in any relation whatever to his new obligations. The call to arms takes little or no account of any man's particular talent or equipment, and, except in the case of the few who have obtained special duties because of their special aptitudes, there has been small attempt to make the military employment fit the civilian training. But the medical man has the privilege of being called upon by the State to serve his country by the exercise of the science and art in which he has been brought up; and, speaking generally, he can do this without further special education. Again, inasmuch as the State cannot afford to dispense with our normal activities for the public health, the medical profession is submitted not to the ordinary lay tribunal, but to the jurisdiction of a medical committee, who can appreciate the difficulties of the position and the force of any claims to exemption upon professional grounds. The medical man in time of war is doing for his country his own work and doing it in his own way.

But this work cannot be done without sacrifice and without hardship. The supreme sacrifice which a man can make has been made week by week by the officers of the Royal Army Medical Corps in company with their stretcher-bearers, as our pages and the war records of the different medical schools testify. But a sacrifice less dramatic than the loss of life, but in a sense hardly less complete, is daily being made by the doctor who gives up his professional life at the call of his country; he resigns all that the patient toil of his early years of practice has built up for him, and he does this with no chance of real security that he will be able to take up later what he lays down. Arrangements have indeed been made in many localities, good in themselves and more or less complete or incomplete; but at the best nothing can safeguard a position which depends upon personal interest and upon qualities of disposition and character, when these factors of success are removed from the scene. This sacrifice, which has been made by a large series of medical men since the outbreak of war, has been embittered in some cases by the feeling, right or wrong, that those remaining behind have made capital or derived gain at the expense of the men who went. That absolute gain has been acquired comparable in any way to the vast profits which certain other sections of the community have been deriving from the war it is impossible to contend. But just as among the individual fighting units the contrast is a crying one between the man in the trenches exposed to hourly danger and terror, and his companion in the munition works living in comfort and safety under the admirable hygiene provided by a careful Government department, and earning enough to keep him in relative luxury—so in the medical profession there is the same contrast between the man who goes to the war and the man who stays behind. The latter is in every case the relative gainer in material things, and the knowledge is galling to all; for very many medical men who for public or private reasons of the most valid sort are remaining at their civil posts long ardently to share the harsher fate of their brethren.

One way only offers by which the inequality can be brought level. Identity of sacrifice for us all is an ideal which cannot be brought about by administrative action, but only by the willing coöperation of each member of a free society. The medical profession is a noble calling. If every member of the profession should now willingly and of his own initiative forgo any absolute war advantage, and, more than that, should try to arrange his life so that he gains no relative advantage over those who have joined the Navy or Army, this high estimate of our calling will be fully justified in the public eye. The reduction of his standard of living to something the level of that of his compeers at the front; the decision to make his work his best possible contribution, in the first instance to national service, and in the second to the welfare of his own profession: these measures will afford a solution to the problems which beset the situation, and which appear to divide the interests of the civilian medical service of the country from those of their brethren with the colours. No complete mobilisation of the medical profession will have been effected, whatever regulations are made, unless the idea of identical sacrifice is kept before us, and that is the level to which all should strive to rise.

The Liquor Traffic and the Food Question.

THE increasing seriousness of the food problem in this country has raised afresh and in a more urgent form the question of the control of the liquor traffic in the interest of national efficiency. The advocates of more rigorous measures in restraint of drinking are now able to reinforce the arguments which they have been wont to base on the detrimental influence of alcoholic excess, by the further argument that the loss of energy-value involved in the conversion of the carbohydrate of grain and sugar into alcohol

represents in itself a serious leakage in our food-supplies, and one that should not be tolerated in a time of threatened shortage. There is, no doubt, a great deal of force in this argument, even though it may be rather less than is represented by some; and no one who examines the facts with an unbiassed mind will be concerned to deny that there is need of further restrictions on the manufacture and consumption of alcoholic beverages in this country. The only question about which there will be any difference of opinion is whether the policy to be pursued should be simply one of restriction, tentative and modifiable according to altering conditions, or whether recourse should be had at once to the drastic method of absolute prohibition of the sale of alcoholic liquors.

The policy of total prohibition has been very strenuously urged on the public attention of late, not only by recognised supporters of the extreme temperance position, but also by many business men and employers of labour, who, while not committed to any doctrinaire views on the alcohol question, are disposed to regard enforced teetotalism as desirable during the term of the war, both on grounds of food economy and as a salutary discipline. The arguments adduced in support of this policy are sufficiently cogent, and the influence and standing of its advocates sufficiently important, to ensure its respectful consideration; and it has moreover an attractive air of thoroughness and simplicity which can hardly fail to recommend it at a time when these qualities are held in such particular esteem. But, despite these recommendations, it may be questioned whether its results in actual practice would be entirely satisfactory—perhaps no one thinks that they would. It is tolerably certain that the enforcement of prohibition would be far from easy. And the difficulties might not be matters merely of popular emotion. One of the many points regarding the action of alcohol that might have been, but was not, studied in the days of peace is the effect on muscular and nervous energy when the habitual use of the drug is suddenly discontinued. Probably discontinuance has no detrimental effect, or at all events none of more than slight and transitory character; but, on the other hand, it is at least conceivable that men who for years have been accustomed to taking some form of alcoholic beverage as part of their diet after a hard day's labour, may be affected by its sudden and complete withdrawal. At the present moment several of the most vitally important industries in the country are relying very largely on the services of older and less robust men—men who have grown up in the use of alcohol; here a relatively small saving in food material would be dearly paid for by lessened activity. Allowance must be made in any regulations for the cases of those in whom abstinence produces ill-effects. There are other difficulties which the policy of prohibition would involve, and these are not remote as the case of those who suffer physically from abstinence may appear to be. Foremost amongst these is the probable development of an illicit traffic in alcohol and in substitutes for alcohol which may be still more detrimental to public health and order. The experience of Russia during the present war is eloquent on this point. In that country the complete and abrupt prohibition of the sale of vodka—practically the only alcoholic beverage in popular use—while it undoubtedly has had excellent results in many directions, has at the same time produced a very serious extension of secret drinking, especially where an excess of local zeal has also prohibited the sale of other and less objectionable alcoholic liquors. Methylated spirit, varnish, and lacquer are amongst the substitutes for vodka which are stated to have been used, and the resulting cases of death or of complete or partial blindness have been extremely numerous. This evil would not be likely to attain to grave development in the case of our own population, but we know enough to see that it must not be ignored. And in this connexion it is, perhaps, significant that in Germany, though the food difficulty has long since reached a degree of urgency, it has not been judged necessary or expedient to adopt the policy of prohibiting the sale of beer, though the supply of materials to the brewer is already under limitation.

The alternative to prohibition is to impose restrictions on the consumption of ardent liquors, and to diminish also the amount of grain and sugar used in their production. The work of the Liquor Control Board has shown how much can be done in both these directions; the effect of their regulations in decreasing drunkenness and alcoholic disease, as measured by the most characteristic manifestation of alcoholism, delirium tremens, has been generally ascribed to the influence of the restricted hours during which public-houses may be opened, and this is unquestionably the main factor in the result; but it is probable that an important part has also been played by the action of the Board in enforcing the dilution of spirits, and in endeavouring to create a popular taste for a very low gravity beer. Apart from its beneficial influence on the public health, the introduction of weaker beers will, of course, involve a considerable saving in the use of food substances; it has been estimated that an all-round reduction of the specific gravity by 10 degrees would decrease the quantity of materials used by close on 20 per cent. Combined with further limitations on the amounts of beer and spirits to be released for consumption, a reform on these lines would go some way to meet the argument for prohibition which has been based on the present need for economy in the use of foodstuffs. Of course, such a policy would have to be general in its application, and, as a large elasticity in adjustment to varying conditions is of its essence, it could hardly be carried out except by a central organisation entirely untrammeled by considerations of trading interest. The most effective way in which these requirements can be fulfilled is obviously under a system of State ownership, and we are glad to note that the immediate establishment

of such a system has apparently been decided upon by the new Government, presumably on the lines adumbrated by Mr. LLOYD GEORGE when he urged the adoption of this policy in the early part of last year. State purchase has long been recognised by all social reformers of reasonable views as a practicable solution of many of the evils of the drink traffic.

Welfare Work in Factories.

THE Welfare Department of the Ministry of Munitions carries out the recommendations of the Health of Munition Workers Committee. With these recommendations we have dealt as they appeared. The primary concern, naturally, of most departments of the Ministry of Munitions is output, which blossoms freely under an official routine, but welfare work is a tender plant which grows by kindness and suasion and withers in an atmosphere of official compulsion. Its chief sphere of action at the present time is to deal with the conditions of life generally among vast numbers of young women introduced—pitchforked one may almost say—by the acute need of labour into the engineering industry. The material of which the worker in munitions is composed, referring now to the female workers, has peculiar attributes and needs special treatment. The treatment is placed in the hands of a welfare supervisor, and the difficulty begins with the choice of a suitable person. It is no good for a welfare supervisor to be a sort of superior forewoman. This only produces envy and irritation. She must manage the employees through her superior knowledge of life and have the quiet authority of position, while actually being willing to minister to their smallest needs. The ideal combination is probably that of supervisor with first-aid nurse. Where large numbers of young women are employed a constant stream of small distempers and accidents find their way out of the workroom. If referred to the male foreman the operatives will necessarily be excused and sent home, with harm to themselves and their work, inasmuch as a series of delicate operations may be checked for the day by the loss of a worker, and the girl herself loses her good record for punctual attendance and has a passing ailment magnified into a day's illness. Referred, on the other hand, to the welfare supervisor for advice and encouragement, the girl may be able, without harm, to return to her work after a short time of rest. The supervisor has at the same time gained her confidence, making the operative feel that she is an individual in whom personal interest is taken, while with this reputation among her charges the supervisor can soon do anything she pleases with them. Here is a field of immeasurable usefulness for the educated woman of leisure and tact, whether she has been recently trained in social work or has passed the age of family cares whilst retaining the motherly instinct necessary. It is social work at the fountain head.

What is the clear result to-day of properly conducted welfare work among female operatives? Not merely that the female operative can give nine hours' work, exclusive of meal times, day or night without obvious harm; but that such work done under fitting conditions may result in an improvement of the physique of the town-dweller which will spell permanent benefit to the race. The woman munition-worker is in the direct road to become healthy, clean, and well-mannered. The health is due to the well-ventilated atmosphere in which she now works, to the good meals at regular hours with proper intervals of rest and recreation. In addition to all this her physique is in no little degree benefited by keenness on the work which is often attractive in itself, for metal turnings are beautiful. Health and keenness react the one on the other. Cleanliness is at first a matter of industrial necessity; overalls and caps must be worn to protect flying garments and hair from the risk of catching in machinery; hot water and carbolic soap, followed by a suitable unguent, are enjoined to avoid dermatitis from handling irritating substances. But these practices lead to a love of cleanliness for its own sake and to the observation that a clean, washable uniform is becoming. Improvement of manners commences as an official necessity; larking is dangerous and has to be forbidden on account of its danger. But the growing interest in the work and in other subjects which a welfare supervisor can tactfully suggest ends by taking the place of any desire for practical joking, as well as of the grumbling at food which is, in all ranks of society, largely a question of mental unoccupation.

In the light of these results we must revise the accepted notions upon the effect of prolonged labour on the health of women workers. In the engineering industry the efficiency of female labour is a discovery, and although in certain large factories up and down the country welfare work has been carried out as a routine for 20 years or more its effects have not been duly appraised. We must now recognise much factory employment as a healthy occupation for young women under proper conditions of atmosphere, rest, nutrition, and personal care, and this is a matter of first-class medical significance. The bad effect of industry on female health was owing to the fact that the surroundings were bad, and although this was quite well known to medical men, and admitted to some extent in the labour world, the public did not accept the facts. They did not believe that the work was largely good in itself, though the conditions under which it was done were often not good. The present experience seems to show that a large proportion of women can, without harm to their work or themselves, continue at it throughout the whole time of their physiological cycle, without requiring more than a little personal consideration of a kind which the welfare supervisor can impose. The moral, which will sometime become a pressing one, is that wholesome industrial conditions are the reasonable demand of workers—women as well as men—in peace as in war, and it will become a charge upon medical men to see that these conditions are forthcoming.

Annotations.

"Ne quid nimis."

THE GOVERNMENT LABORATORY AND THE WAR.

As might have been expected, the war has placed considerable pressure upon the time and energies of the Government laboratory officials, and this is well shown in the report for the year ended March 31st, 1916, of the Government chemist, Sir James J. Dobbie, which was issued last week. The samples of food examined in connexion with the supply of the Expeditionary Force alone numbered 8901, as compared with 1348 recorded in the previous report. The greater part of the work of the department is carried out at Clement's Inn and in the branch laboratory at the Custom House. Six of the branch stations for testing for revenue work have been closed temporarily during the war, but the total number of samples examined from all departments was 383,892. There was a large increase in the number of samples of export tobacco examined due to the despatch of tobacco for the use of the British Expeditionary Force. The number of certificates issued in connexion with these samples was 81,889, an increase of no less than 48,179 over the corresponding period of last year. The food-supplies examined for the War Department included Army biscuits, flour, bread, pearl-barley, oatmeal, arrowroot, sago, and tapioca, desiccated potatoes and other vegetables, condensed and fresh milk, cocoa, jam, and meat extracts and essences, pepper, calf's-foot jelly powders, mustard, hops, malt, and beer, tinned meats and fish, soup powders, butter, sugar, and cheese. Tender samples were examined as to conformity with the specification, and bulk deliveries to ascertain whether they compared satisfactorily with the selected tender samples. In this direction more than 6000 samples were taken from contractors' deliveries in course of transit to the Expeditionary Forces. This system of control has, no doubt, effected considerable economies. The work now carried out at the Government laboratories is of great service to the nation and is of a much more comprehensive character than it was in the old time, when the Somerset House laboratories were practically exclusively devoted to questions of revenue and excise.

STAPHYLOCOCCIC MENINGITIS.

An interesting case of cerebro-spinal meningitis due to the *Staphylococcus pyogenes albus* is reported in the *Archives de Médecine et Pharmacie Navales* for September by Dr. H. Bourges, médecin de 1re classe (staff-surgeon) in the French Navy. This case had a happier ending than most, for all the other similar cases quoted from the literature proved fatal, and Dr. Bourges ascribes the recovery of this patient to an artificial abscess he provoked by the method of Fochier—i.e., by the subcutaneous injection of sterile turpentine. The patient, a sailor, was suddenly attacked on Dec. 10th, 1913, when on sentry duty, with violent frontal headache, pains along the spine, weakness, and vomiting; his temperature was 103° F. When he reached hospital on the 11th a lumbar puncture removed 30 c.c. of fluid, and 20 c.c. of antimeningococcus serum was injected. As this injection produced no benefit it was never repeated. The fluid withdrawn contained no meningococci, only Gram-positive cocci and diplococci. On the 12th lumbar puncture was repeated and the patient began to improve, but on the 18th he relapsed, with severe frontal headache, pain along the spine, stiff neck, temperature 104°, but pulse only 80, insomnia, and daily losing of weight. He was having ice to his head and a warm bath every four hours, a collargol enema, and daily intravenous injections of electrargol. The sputum was examined for tubercle bacilli and pneumococci without result, but from the fluid of a third lumbar puncture the *Staphylococcus pyogenes albus* was grown. The temperature continued steadily at the same high level, the general condition persisted, and a fourth lumbar puncture on Dec. 29th showed that the cerebro-spinal fluid was purulent, the cells mainly polymorphonuclears, and it was decided to provoke a fixation abscess by the method of Fochier. Accordingly 1 c.c. of turpentine was injected into the cellular tissue of the left thigh. Conditions improved at once and the temperature fell next day to 100° as the local inflammation developed. On Feb. 3rd the abscess was opened and many Gram-positive cocci were seen in the pus, from which also *Staphylococcus pyogenes albus* was recovered. The general condition rapidly improved, the patient could sleep, and "imperiously demanded food." By the 6th he had gained 10 lb. in weight, and all was going well when, on the 9th, he again relapsed. This time the fifth lumbar puncture showed a fluid clear and under slight pressure, with lymphocytes as the predominant cells. After this lumbar puncture he immediately improved, but suffered from slight post-febrile insanity for a time, ultimately being discharged cured, but still weak, after a little more than three months in hospital. Dr. Bourges considers the important points in the differential diagnosis of staphylococcic meningitis to be: the headache always frontal, the continuous pyrexia, the slower pulse, the more purulent cerebro-spinal fluid with blood in it and staphylococci. The fixation or artificial abscess is, he observes, useful in treating cases for which we have no antiserum. It acts first of all as a trap for microbes attracted into this new abscess, and probably also it stimulates additional formation of antibodies, thus increasing the bactericidal activity of the blood. It is, he thinks, of special advantage in staphylococcal or streptococcal infections.

THE METROPOLITAN WATER-SUPPLY.

During the month of August, 1916, the rainfall (Thames basin) was 1·33 of an inch above the average mean rainfall for that month during the previous 33 years. The results of the chemical examination showed that all three raw Thames waters deteriorated or showed no change in quality, and the same was the case with the filtered waters. The quality compared favourably with the 1915 averages in both cases. Bacteriologically the raw Thames and New River waters contained fewer, and the raw Lee water more, bacteria than their respective averages, while the filtered waters yielded, generally speaking, not unsatisfactory results. In September the rainfall was 0·37 of an inch below the average mean rainfall for that month during the previous 33 years. Chemical examination showed that the raw Thames water improved slightly in quality according to the albuminoid test, but deteriorated as measured by the oxygen absorbed, turbidity, and colour tests. The filtered

waters showed a similar deterioration, including that shown by the albuminoid test. Both, however, showed results better than or equal to their respective averages in 1915. The raw Thames and Lee waters contained more, and the raw New River water fewer bacteria than their respective averages for the year 1915, while the filtered waters were satisfactory. In October the rainfall was 4·70 inches, or 1·48 inches above the average. Chemical examination in some respects showed a deterioration in regard to raw Thames and Lee waters, but an improvement in regard to raw New River water. There was also a certain deterioration shown in the filtered waters, but bacteriologically they were satisfactory, containing no typical *B. coli* even when 100 c.c. of the water were examined.

ANÆSTHESIA IN AMERICA.

THE publication of an American *Year Book of Anæsthesia and Analgesia* proves the interest which is expended in that country upon the study of anæsthetics, and affords also an index to the work done in the same direction. The editor, Dr. F. H. McMechan, explains that it had been intended to make the volume more international than it is, but we think that the loss of continental contributions is more than balanced by the gain of some peculiarly American features. Generally speaking, the most valuable and most striking portions of the book are those that deal, not so much with the practice of anæsthesia, as with its physiology and with the theories that endeavour to explain its causation and essential nature. Professor Ralph S. Lillie's thesis upon the physico-chemical theory of anæsthesia contains a well-reasoned discussion of current views, and puts forward excellent arguments for the belief that alterations in the physico-chemical properties of the plasma-membrane form the essential basis of anæsthesia. Whatever condition alters this structure so as to make it less capable of undergoing the changes of permeability and of electrical polarisation which normally accompany stimulation—and apparently other forms of cell activity—this condition has an inhibiting or paralysing effect on the cell. Professor Lillie's arguments supply an explanation of the action of all anæsthetic agents, and are therefore more inclusive than the views of Professor Benjamin Moore and Dr. H. E. Roaf which have hitherto received a large amount of attention and acquiescence. It is in the altered electrical conductivity of narcotised cells that Professor Lillie finds the most conclusive evidence of a decreased permeability during narcosis, pointing out that there appears to be a general relation between susceptibility to narcosis and the degree of organisation. Plants and lower organisms require higher concentrations of anæsthetic than higher animals; in vertebrates the cells most susceptible to narcosis are those of the higher brain centres. When organisation is destroyed many of the chemical processes of protoplasm, such as oxidations and fermentations, may continue and may be slowed by anæsthetics, but much higher concentrations of the latter are now necessary. This indicates that, when anæsthetics influence oxidative and other metabolic processes within the cell, they do so not directly, but through their influence upon some specially sensitive intermediary, which is a part of the organised structure of the cell and itself controls the rate of the intracellular chemical processes. Thus Professor Lillie's arguments and facts appear to justify a conception of anæsthesia wider than that which was pictured by the statements of Professor Moore and Dr. Roaf. Other papers in the volume deal with blood changes under anæsthesia and with the origin of shock, with circulatory disturbances due to laparotomy, posture, and anæsthesia, and with blood pressure under anæsthesia. In addition there are articles describing work which is already well known, such as that of Dr. Wilfred Harris on injection of the Gasserian ganglion for trigeminal neuralgia and of Dr. Goodman Levy upon ventricular fibrillation. The editor contributes a profusely illustrated account of nasal administration of nitrous oxide; articles of a practical nature upon colonic ether-oil anæsthesia, upon delayed chloroform poisoning, and upon other and more unusual subjects, such as "The Use of Music during Anæsthesia," and "Some Psychic Factors of Anæsthesia," fill a volume which we hope will prove the first of a valuable series.

EXPERIMENTAL ATTEMPTS TO TRANSMIT PELLAGRA.

THE causation of pellagra is still enshrouded in doubt, investigators of the malady being at present divided mainly into two opposing parties, one attributing its origin to a specific infection, the other classing it as a dietary disease due to a deficiency of some essential substance or a want of balance in the staple articles of diet. The combat between these two opposing camps is more active in America than at home, the first hypothesis being supported by the Thompson-MacFadden Pellagra Commission of the New York Post-Graduate School, while the second finds a strenuous upholder in Dr. Joseph Goldberger, of the United States Public Health Service, who has for some time been specially investigating the malady. This expert has already published details (see THE LANCET of Jan. 8th, 1916) of the experimental production o pellagra by the continued use of a deficient or ill-assorted diet among some convicts in an American penitentiary who had volunteered to submit themselves for the test. In continuation of his observations he has undertaken a fresh series of experiments, the results of which have been recently published in the *United States Public Health Reports*. Assuming that if a specific infection existed it would probably be found either in the blood, the naso-pharyngeal secretions, the skin lesions, or in the excreta, Dr. Goldberger made attempts to transmit the malady by (1) the intramuscular or subcutaneous injection of blood, 5 to 7 c.c., from a sufferer into the system of healthy individuals; (2) the application of the pellagrins' naso-pharyngeal discharges by a swab to the healthy mucous membrane of the nose and naso-pharynx of the subjects of experiment; (3) the administration by the mouth of epidermic scales, up to 4 milligrammes, scraped from the pellagrous lesions of the skin; and (4) the ingestion of excreta—namely, urine up to 6 c.c., and fæces up to 8 grammes—from pellagrous cases by healthy persons. It may be explained that the scales, urine, and fæces were given in the form of pills, the material being mixed with bread or biscuit-crumbs and flour made into a pilular mass. The original number of persons who volunteered to submit to these extremely revolting experiments

was 20, of whom 13 were medical men, their ages ranging between 26 and 42 years, but it was found possible only to make use of 16 of them. The material for the tests was obtained from 17 pellagra patients of varying types and of different degrees of severity. The experiments were begun towards the end of last April and were continued to the end of June, so that a period of from four and a half to seven and a half months has elapsed since their initiation, long enough, it is thought, to enable a definite statement of the results to be made. Blood was furnished by 4 pellagrous persons, naso-pharyngeal discharges by 4, epidermal scales by 5, and urine and fæces by 16. Up to the date of report, early in November, not a single individual of those experimented upon developed any evidence to justify a diagnosis of pellagra, although, as might have been expected from the nature of the material swallowed, some four or five had immediate, but only temporary, gastro-intestinal disturbance. It would therefore appear that while the opinion that this disease is a communicable one gains no support from these experiments, the conclusion elsewhere drawn by Dr. Goldberger that it is an affection essentially of dietary origin brought about by a faulty, probably deficient, diet is materially strengthened.

UVEOPAROTID FEVER.

IN 1909 Heerfordt described by the name uveoparotid fever a new variety of infectious disease characterised by chronic inflammation of the parotid gland and of the uvea. His three patients each had bilateral parotid swelling and bilateral iridocyclitis, and two of them developed paralysis of a facial nerve in addition. The parotid swellings lasted for from 2 to 13 weeks, and so Heerfordt concluded that he was not dealing with cases of mumps; in addition, inquiry failed to show that his patients had been exposed to this infection, as no cases of epidemic parotitis in their neighbourhood could be heard of. He was able to find in the literature only two similar instances of this very chronic infection of the parotid glands and uveal tract, combined with facial paralysis. Dr. H. W. Leeksma, of Heukelum, has recently described[1] another instance of the disease. The patient, a married woman aged 28, felt tired early in January, and had cold shivers and night sweats, and in a few days' time had attacks of dizziness. On Jan. 21st she had pain in the left ear; on Feb. 2nd Dr. Leeksma found she had a right-sided Bell's palsy. On Feb. 8th the left parotid gland became swollen and painful. The Bell's palsy had cleared up by Feb. 21st, but two days later herpes of the left cornea occurred, and was followed by iridocyclitis. On March 3rd the right parotid gland swelled up, and on March 5th the right eye exhibited the signs of iridocyclitis. On April 10th a roseolous eruption appeared on the legs and remained for a fortnight. By April 25th the parotid swellings had vanished, and the iridocyclitis had improved in both eyes, though synechiæ had appeared. On June 20th the affection of the left eye became suddenly worse, and the left parotid region was very painful. In August it was necessary to take the patient into an eye hospital for treatment. Dr. Leeksma found three typical cases of mumps occurring in the patient's environment in the month of February. He remarks that both iridocyclitis and facial paralysis are known to occur, though but rarely, as complications of epidemic parotitis. He adds that the facial paralysis in the case he describes preceded the swelling of the parotid gland, and so cannot be attributed to the influence of mechanical pressure. He comes to the conclusion that Heerfordt's uveoparotid fever is nothing more or less than atypical mumps, and is not a new morbid entity. It should be added that the von Pirquet and Wassermann reactions in Dr. Leeksma's patient both proved negative.

[1] Nederl. Tijdschr. v. Geneeskunde, Amsterdam, 1916, ii., 1126.

THE TERCENTENARY OF BARTHOLIN.

Thomas Bartholinus, born Oct. 20th, 1616, died Dec. 4th, 1680, was one of Denmark's most famous men of science, and his tercentenary is celebrated by the October issue of *Janus*, which is given over to a record of his life and works. He was born in Copenhagen, the son of a well-known University professor. After a course of study at the Copenhagen University he went abroad to study at the age of 21. It is interesting to note that this period of travel and learning occupied ten years. All the while, it is said, he studied and wrote with the greatest diligence. He returned to Copenhagen and was appointed to the chair of anatomy. At the early age of 44 he moved to his estate and lived afterwards in peaceful retirement, so that he made all his important discoveries during the short space of 14 years. Bartholin's claim to fame rests upon his discovery of the thoracic duct and the lymphatic system in man. A man, tranquil in temperament and capable of enjoying to the full the social glamour and fame he rapidly gained, it is said that he often wished he had never found the small, scarcely visible lymphatic vessels, because of all the strife, controversy, and annoyances associated with their discovery. Bartholinus lived in ample and generous days, when distinction in one sphere of life did not preclude honour in other walks, for besides occupying various public offices he was also a judge of the Supreme Court. It was his son, Caspar Bartholinus, who discovered the glands, called after his name, in the vagina, and the ductus Bartholinianus. He, like his father, appears to have early given up scientific work. He entered the Civil Service and gained a patent of nobility which was conferred not only upon him but reverted back to his father, who had been dead for 50 years.

THE LANCET, VOL. II., 1916: THE INDEX.

THE Index and Title-page to the volume of THE LANCET completed with the issue of Dec. 30th will be ready early in the New Year. Owing to the continued shortage in the paper-supply, the Index will not be issued with all copies of THE LANCET, as was the custom prior to the War. Subscribers who bind up their numbers are requested to send a post-card to the Manager, THE LANCET Office, 423, Strand, London, W.C., when a copy of the Index and Title-page will be supplied free of charge.

Dr. E. Coey Bigger has been appointed a Commissioner of the Irish Local Government Board in the room of Sir Thomas Stafford, who has resigned. Dr. Bigger is one of the inspectors of the Board, and was a member of the Vice-Regal Committee on the Poor Law whose far-reaching report attracted great attention some ten years ago.

DENTIFRICES.

MODERN dentifrices may be divided broadly into four groups: (1) Powders, (2) pastes, (3) solid soaps, and (4) fluids. The demand of the public appears to be in favour of powders, pastes, and soaps, the presence of a mechanical agent in these being appreciated while such is usually omitted from fluid preparations. Of 19 samples of dentifrices which we recently purchased in the open market seven were powders, eight were pastes, two were solid soaps, and two were clear fluids. Many formulæ of dentifrices have been published from time to time, and in most cases the design appears to aim at securing the combined offices of a germicide, antifermentative, deodorant, antacid, and a mechanical detergent. Such a combination presents no difficulty in the making, but it is important that the materials chosen should be carefully prepared and blended and free from injurious constituents, and that the whole result should be attractive. It is the invasion of the enamel by disease organisms which begins in many cases the degradation of the tooth, and the process of decay, unless arrested, leads eventually to that exquisite trouble so widely experienced. This has led to the policy of maintaining mouth asepsis, the careful cleansing of the teeth being now put into very general practice by the daily use of the tooth-brush and a dentifrice. A dentifrice may clearly do more harm than good if it is carelessly prepared or contains inappropriate constituents, and its choice is therefore important.

According to THE LANCET Laboratory examination a constituent common in dentifrices is chalk, and as an antacid it has claims, but it possesses no germicidal or antifermentative properties, and though serving as an effective mechanical detergent may, unless it is a finely triturated preparation, injure the enamel by erosive action. It should, in other words, be free from gritty particles which are likely to scratch. Other mechanical detergents are employed, as, for example, silicious substances like kieselguhr and talc, which, however, have no acid-neutralising properties and may contain particles capable of producing injury to the enamel. A finely comminuted mechanical detergent containing an effective antiseptic seems desirable, but it is extremely important that this detergent should be perfectly smooth and free from gritty particles. The removal from the cavities of the teeth of decaying particles of food which are readily hydrolysed and fermentable is not always possible by the toothbrush alone, and it has been said on good authority that the chewing of coconut or even an apple acts as an effective scourer of the teeth with the free use of the wet brush afterwards.

Soap, again, is a very common constituent of dentifrices and is often associated with chalk. It serves, of course, as a cleanser and antacid and there can be little objection to its use. It also acts as an adjuvant favouring the formation of a uniform emulsion. Amongst other adjuvants or excipients used in dentifrices are glycerine and sometimes sugar.

Amongst the antiseptics chosen is a wide range of essential oils and aromatics, all of which possess more or less germicidal properties. Popular amongst these are thymol, carbolic acid, hydrogen peroxide, benzoic acid, wintergreen, and the mint oils. Cinnamon also is a favourite, and it is known to have valuable antiseptic properties.

These generalities considered, we may pass to the actual results of our examination of a number of dentifrices which fairly represent the kind in public use at the present time. We deal with them in the order already set out, which is as follows: (1) Dry powders; (2) pastes; (3) solid soaps; and (4) fluids.

(1) *Dry powders.*—As will be seen from the accompanying table, these all contained chalk (mostly represented in an insoluble ash effervescing in acids) in prominent quantity, the percentage amount lying between 32·33 and 88·12. In many cases the chalk was not finely comminuted, as an inspection of the table will show. With two exceptions soap was present and an antiseptic, such as phenol and thymol, and essential oils, of which eucalyptus appeared to be in favour. One contained a decided amount of sugar and in others starch granules, the desirability of which is doubtful. In two instances the powders were found to yield available oxygen on suitable treatment. These preparations would probably have a slight bleaching effect on the teeth. Most of the powders were agreeably perfumed, and in certain cases orris root was a considerable constituent.

(2) *Pastes.*—The pastes showed, generally speaking, a wider range of composition than the other preparations examined. The substances found included chalk, sugar, soap, starch granules, silica, areca, and germicidal substances, amongst which were benzoic acid, wintergreen, thymol, mint, and other essential oils. In one case in which

THE COMPOSITION OF DENTIFRICES.

Number of dentifrice.	Moisture.	Ash.	Insoluble ash (chiefly chalk).	Soluble alkali as Na_2O.	Alcoholic extract (chiefly soap and glycerine).	Microscopical observations.	Antiseptic agents.
POWDER.	%	%	%	%	%		
1	0·54	88·82	88·12	0·68	0·46	Uniformly sized chalk particles, with a few angular pieces; starch present.	Aromatics.
2	8·27	63·28	62·56	0·64	3·20	Uniformly sized chalk particles, but not well levigated; starch present.	Phenols.
3	7·15	36·00	32·33	3·25	2·40	Starch granules, fine chalk particles, but not uniformly distributed.	Aromatics.
4	1·50	82·00	77·50	3·96	3·00	Well-levigated, uniformly sized chalk particles, quite non-gritty.	Essential oils, peppermint.
5	Nil.	71·20	66·43	4·23	10·40	Well-comminuted chalk, with starch granules, non-gritty.	Wintergreen.
6	3·50	59·50	47·91	1·40	4·40	Fine, smooth chalk particles, non-gritty.	Clove, essential oils, available oxygen.
7	3·20	64·80	60·99	3·38	16·04	A finely comminuted powder, free from irregular particles.	Oxygen and thymol.
PASTE.							
8	2·00	11·80	11·20 (silica)	0·53	36·84	Irregular sized mineral particles, with starch granules.	Aromatics.
9	32·75	33·00	29·13	3·44	34·20	Smooth and well-comminuted chalk quite free from gritty particles.	Peppermint, thymol.
10	26·31	21·44	14·74	5·91	42·64	Particles irregular in size, comminution not good.	Thymol, wintergreen.
11	14·62	13·21	11·16	1·37	51·44	Starch granules and a few irregular mineral particles.	Aromatics.
12	26·62	21·12	16·98	3·67	53·36	Contained a well-comminuted powder, perfectly smooth and free from grit or irregularities.	Benzoic and essential oils, peppermint, &c.
13	18·58	32·43	20·20	10·80	35·44	Irregular particles; the chalk not sufficiently comminuted; some starch.	Essential oils.
14	23·10	36·58	36·04	0·47	32·00	Very fine and smooth chalk particles well comminuted.	Menthol.
15	20·35	19·32	18·61	0·60	51·64	Somewhat coarse particles, showing defective levigation; some starch.	Thymol, eucalyptus.
SOAP.							
16	5·60	35·70	22·98	11·20	71·42	Good round particles of chalk, but capable of further levigation.	Aromatics, essential oils.
17	4·89	28·44	13·86	12·20	81·25	Good smooth and regularly sized chalk powder present.	Essential oils, perfume.
FLUID.							
18	99·83 (alcoholic)	Nil.	—	—	—	Clear fluid.	Essential oils, menthol.
19	72·02 (alcoholic)	1·63	Nil.	1·40	27·98	Clear fluid.	Aromatic and essential oils.

thymol was used the preparation had a rather sharp, stinging effect on the tongue. On the whole the chalk present in these pastes was in a much better state of comminution than in the dry powders. In this respect some were decidedly superior to others. As the microscope showed, the mechanical detergent was here and there crude, presenting irregularly sized and gritty particles likely to damage in the long run the enamel of the teeth. It is most desirable that chalk and kindred mechanical agents should be very finely triturated. Where this was the case the dentifrices were excellent in their effect and very agreeable to use. The presence of sugar, both cane and glucose, may be open to objection, and it is probable that these substances have recently replaced glycerine owing to the restrictions on the supply caused by the extensive use of this substance for war purposes. Another hydrolysable carbohydrate, starch, does not appear to be a desirable ingredient of a dentifrice.

(3) *Soap dentifrices.*—Soap tablets for purposes of cleansing the teeth are commonly combined with some chalk or phenol or essential oils. The oils are generally of the character of perfumes, and cinnamon seems useful. On the whole, the chalk in these preparations was fairly well comminuted, but some specimens might well be improved in this respect.

(4) *Fluid dentifrices.*—These consisted generally of a solution of essential oils in spirit. When added to water a milky fluid results, which, however, can possess little if any mechanical detergent action to speak of. In one case there was also dissolved in the spirit some soap.

In conclusion, we do not pretend to have exhausted the subject, but we think that sufficient information has been obtained in the course of the inquiry to show the chief points in regard to the composition and character of the dentifrices which find public patronage.

THE CONTROL OF VENEREAL DISEASES.

Scheme for the City of London.

THE City Corporation has recently approved a scheme for the treatment of venereal diseases, and the work will be carried out in conjunction with the authorities of St. Bartholomew's Hospital. A special centre will be established in a building erected several years ago by the Corporation for use as a hospital. Here will be held a clinic at which will be treated cases in the communicable stage, and, in addition, at least ten beds will be available for in-patient treatment. Other beds, as may be found necessary, will be provided in the hospital. Adequate provision for teaching and demonstration purposes has been arranged. The hospital authorities will be responsible for the administration and staffing of the centre. In addition to the necessary nursing and general assistance, the work will be in charge of a member of the hospital staff, assisted by a senior whole-time medical officer. A new junior appointment will be created at the hospital, and this medical officer will divide his time between the work in the skin department and the new department. The entire resources of the hospital, as in the case of the tuberculosis dispensary, will be available for assistance in special cases. The simpler bacteriological work will be done at the centre, but all investigations requiring special tests or cultural methods will be under the charge of the pathologist of the hospital and will be carried out in his laboratory. The usual provision of outfits for the forwarding of pathological specimens by medical practitioners, the free distribution of salvarsan, and arrangements for necessary consultations have been provided for. Dr. W. J. Howarth, medical officer of health of the City of London, will arrange to deliver lectures to the staffs of city firms and will be assisted by a woman doctor, who will lecture to women. It is proposed that St. Bartholomew's Hospital shall receive a sum of £1800 for the first year's work (not to include the cost of salvarsan). The necessary equipment and alterations will involve a capital expenditure, in addition, of about £1000.

At the same time as the scheme came up for consideration the Court of Common Council approved resolutions recording their opinion :—

(*a*) That administrative measures for the diagnosis and treatment of venereal diseases will only attain their maximum effectiveness in protecting the public health when the treatment of such diseases by unqualified persons is prevented by law.

(*b*) That it is desirable that the recommendation 58 (iii.) of the Patent Medicines Committee of the House of Commons endorsed by the Royal Commission on Venereal Diseases, "That all advertisements of remedies for diseases arising from sexual intercourse or referring to sexual weakness be prohibited," should at once be carried out.

The following resolution was also passed by the Sanitary Committee :—

That it be referred to the medical officer of health to report, at the termination of six months, on the working of the scheme for the treatment of venereal diseases in the City, and to submit such information as may have been collected bearing on the desirability of compulsory notification and compulsory treatment of these diseases; and further to consider and report whether special legislative action is necessary to prevent persons suffering from venereal disease from engaging in occupations associated with the food-supply.

Early Experience of Statistical Notification in Western Australia.

Dr. R. C. Everitt Atkinson, Commissioner of Public Health for Western Australia, sends us a report on the working of the first months of a scheme of confidential statistical notification of venereal diseases.[1] Forms of notification were sent to medical men early in June, and 70 have responded. Of the total of 563 cases reported up to Sept. 30th as "not previously under treatment for the present infection," 181 were of syphilis, an unusually high proportion probably explained by the much longer treatment required for syphilis than for gonorrhœa. In October the numbers of fresh notifications were: syphilis 33, gonorrhœa 91, chancroid 9. The Commissioner comments upon the flagrant disproportion between the numbers notified for the two sexes; whereas 155 cases of syphilis and 333 of gonorrhœa were notified in males, there were only 26 and 29 cases respectively notified in females. He concludes that females are much less inclined to seek medical advice, and states that the problem of dealing with the many cases of gonorrhœa in females not under medical treatment is receiving careful attention.

Routine Treatment of Venereal Diseases.

At the request of the National Council for Combating Venereal Diseases a sketch of the routine treatment for venereal diseases as carried out at the military hospital in Rochester-row has been drawn up by Lieutenant-Colonel L. W. Harrison, the officer in charge. In the preface to this pamphlet of 14 pages Colonel Harrison states that there is no finality in the treatment of venereal diseases, and the outline is to be regarded simply as a bulletin of progress. Thus regarded, its appearance is timely, and the outline will serve a most useful purpose. The methods of treatment given are those which have stood the test of practice in the critical atmosphere of a teaching centre. The pamphlet is published by the National Council at Bank Buildings, Kingsway, London, W.C., price 2*d.* (post free 2½*d.*).

Treatment of Pregnant Women.

The hospital accommodation for pregnant women is occupying the attention of the National Council for Combating Venereal Diseases. In consequence of the reluctance of the principal lying-in hospitals in London to receive such cases, many innocent sufferers have heretofore been compelled to enter Poor-law infirmaries if in need of institutional treatment. A recent conference between the National Council and the medical boards of these hospitals is likely to result in remedying this situation.

CANADA.

(FROM OUR OWN CORRESPONDENT.)

Canadian Research Board.

THE Federal Government has announced the creation of a National Scientific and Industrial Committee for Canada, and has indicated the programme to be carried out by the new body. For the direction of this work the whole time and service have been requisitioned of Professor A. B. MacCallum, F.R.S., professor of biochemistry in the University of Toronto, and President of the Royal Society of Canada. As chairman of a National Scientific and Industrial Committee, Professor MacCallum will bring to the discharge of his duties ripe experience and educational qualifications of the highest academical value. The first duty of the committee will be to outline plans and mature measures for scientific research which will later prove of benefit to the industrial interests of

[1] THE LANCET, 1916, ii., 284.

the Dominion. Amongst some of the plans anticipated will be a scientific study of Canada's unused resources, the waste and by-products of farms, forest, fisheries, and industries. Trained and competent research men will be added to the staff as the work progresses, and the public are to be kept duly apprised of the results of the investigations.

Pension and Discharge Boards.

Mr. J. K. L. Ross, Montreal, has been appointed by the Federal Government chairman of the Canadian Permanent Pension Board. The medical member is Major J. L. Todd, associate professor of parasitology in McGill University. Major Todd made a careful study of pensions in England and France, and for a time served on the Pensions and Claims Board of England. Pensions will be awarded in direct proportion to the disability incurred, and disabled men discharged from the Canadian Army will be divided into six classes:—I., Total disability, 100 per cent.; II., Disability, 80 per cent.; III., Disability, 60 per cent.; IV., Disability, 40 per cent.; V., Disability, 20 per cent.; VI., Disability under 20 per cent. In the several military districts subboards are being appointed. The Military Hospitals Commission of Canada is appointing Discharge Boards to examine convalescent soldiers who are eligible for pensions. In Manitoba, Dr. H. H. Chown, Dr. Popham, and Dr. Galloway have been appointed, all of Winnipeg. In British Columbia, Dr. O. M. Jones and Dr. R. L. Fraser, Victoria, and Dr. W. J. C. Towalin. Lieutenant-Colonel Mackenzie Forbes has been appointed medical officer of the Hospitals Commission in Montreal.

The Tuberculous Soldier in Canada.

The Military Hospitals Commission of Canada is considering the problem of the tuberculous soldier when he arrives home from abroad, as well as the man who has enlisted for overseas service, but who was found to be tuberculous before being sent across the Atlantic. A committee of experts have advised the temporary treatment of these soldiers in existing sanatoria and the purchase of properties in localities suitable for the treatment of tuberculous cases. The western provinces have been provided for by the securing of the sanatorium at Frank, Alberta, which contains 120 beds. With the existing sanatoria at Tranquille (B.C.), Ninnette (Manitoba), and Calgary, sufficient accommodation is available for Western Canada at present. The lower provinces will find accommodation partly in Quebec, St. John (N.B.), Kentville (N.S.), and Charlottetown (P.E.I.). In Ontario the Sir Oliver Mowat Institution at Kingston, and the Hamilton and London buildings have been secured. The two latter are to be materially enlarged by the joint aid of the Hospitals Commission, the Ontario Government, and the municipalities of Hamilton and London respectively.

The Clayton Convalescent Home, Halifax, N.S.

A convalescent home—the first of its kind—was recently opened in Halifax (N.S.) for the education, vocational, and physical training of disabled soldiers. Although such training is now in progress in other institutions of Canada, this is the first devoted exclusively to the work. The founder, Mr. W. J. Clayton, Halifax, has presented it to the Hospitals Commission. Provision has been made for instruction in cobbling, tailoring, and automobile driving. Arrangements are in progress for other trades. The first soldiers to be admitted were 17 from Jamaica who suffered from frost-bite last winter while on a transport going to England, necessitating the amputation of one or both feet.

Infantile Paralysis in Ontario.

The Ontario Board of Health are meeting with success in the prompt steps taken for combating infantile paralysis. In September there were 76 cases in the province with 7 deaths, while in October there were 31 cases with 7 deaths. The cases in October were scattered over 17 counties without concentration in any particular locality.

The Problem of the Feeble-minded in Toronto.

A recent session of the Public Health Section of the Academy of Medicine, Toronto, was devoted to a symposium on the subject of the feeble-minded in Toronto, which was opened by Dr. Clair M. Hincks, the present head in succession to the founder, Dr. Charles K. Clarke, of the Psychiatric Clinic, at the Toronto General Hospital. Dr. Hincks related the results of an investigation lasting over two and a half years and dealing with 1445 examinations. 50 per cent. of the feeble-minded cases examined were known to be criminals and 285 of them habitual thieves, all of whom were still at large in the city. Fifty-nine people examined expressed a delight in burning down buildings and 120 admitted to murderous intentions; these also were still roaming the streets. 60 per cent. of all the social victims on the streets were stated to be feeble-minded. There were also examined 201 feeble-minded school-children regarded as absolutely incorrigible, 53 being sexually abnormal; they were still mixing with the normal children of the schools. These facts, the speaker said, were of the most pressing interest to the municipal and provincial educational authorities. Dr. Clarke agreed with the speaker that the problem of the feeble-minded must be forced upon the attention of the authorities, and no longer be allowed to fall between the provincial and the municipal bodies. The meeting passed a resolution in favour of increased institutional care for the mentally defective at the earliest possible date.

Dec. 13th, 1916.

PARIS.

(FROM OUR OWN CORRESPONDENT.)

Infant Welfare in Paris during the Second Year of War.

Professor Pinard recently made a communication to the Academy of Medicine on the protection of infant life in Paris during the second year of war. With protective measures similar to those of the preceding year, the figures of the second year are nevertheless not so good. At 95 per cent. of the 26,179 registered births the Assistance Publique rendered aid. The percentage of stillbirths rose from 6·6 to 7·7; the proportion of infants put out to nurse from 13 to 22 per cent.; the maternal mortality from 0·46 to 0·48 per cent. The greater number of abandoned infants (5·2 instead of 2·9 per cent.) and of premature births, and the diminution of the average weight at birth, all these are attributed to economic causes which M. Pinard vigorously denounces—namely, the presence in munition works of pregnant and nursing women. He demands the exclusion from the factory of both these classes, as well as the woman who has been delivered less than six months. To this drastic remedy M. Strauss took exception in view of the stern necessity of the war, and upon his suggestion discussion on M. Pinard's communication was postponed until a later meeting.

The Excellent Sanitary State of Paris.

M. Deslandres, a municipal councillor, has drawn up for his colleagues an important report on the working of the vaccination service from the beginning of hostilities. He states that during 28 months of warfare there have been registered in Paris a grand total of 3 cases of variola, 3 cases of varioloid, with a single death. The last case was noted on Dec. 15th, 1915, and the year 1916 has been unique in the statistics in having to its credit no single case of either variola or varioloid. These results are the outcome of the zeal of M. Guilhand who directs the vaccination service. For the first time in history a war on French territory has been unaccompanied by an outbreak of small-pox.

Treatment of Gunshot Wounds with Ointments.

M. Paul Gibbon recommends a reversion to the old treatment of wounds by the employment of ointment, confining its use to the long suppurative tracks produced by shell explosion. After opening up the wound he applies an ointment consisting of: aristol and dermatol āā 1·5, salol 6, lanolin 30, and vaseline 30 parts. The dressing is changed every 2–4 days. He reports the relief of pain as almost immediate and a surprising rapidity in the process of healing.

Antisyphilitic Measures in Morocco.

These have recently been the subject of an important communication by Dr. Leredde to the Paris Society of Medicine. Syphilis is universal among the native population of Morocco and spreads widely from it to the army and the European population. The measures taken by the Service de Santé have aimed at sterilisation, particularly in the soldier, during the initial period by means of modern methods and eliminating by early preventive treatment the later manifestations of the disease. Soldiers with a chancre of whatever nature are directed to the subdivisional ambulance,

and, if the spirochæte is demonstrated by microscopical examination, energetic treatment at once follows. Treatment centres and laboratories have been set up in the principal towns in Morocco for dealing with civilian disease. Lastly, measures have been taken to divide the prostitute into three classes: non-syphilitic, infectious syphilitic, and non-infectious tertiary. In the second class energetic antisyphilitic treatment is applied. These measures, initiated by General Lyantey and ably organised by Dr. Leredde, are the first serious attempt to deal with the evil in Morocco, and good results are to be looked for.

The Action of Picric Acid on Blue Pus.

Blue pus has been frequent in the course of healing wounds at base hospitals, especially where fistulæ have been present leading down to bone—e.g., resections, osteomyelitis, purulent pleurisy. The antiseptics usually employed—alcohol, iodine, formalin—are toxic, tend to produce or keep up a dermatitis, and kill the newly formed tissue cells. At an Army Medical reunion at the Beauvais centre, Dr. Chazarain showed that 1 per cent. picric acid solution causes a rapid disappearance of blue pus without fear of general or hepatic toxic action and stimulates at the same time the active replacement of epidermic cells.

Jan. 1st.

VITAL STATISTICS.

HEALTH OF ENGLISH TOWNS.

In the 96 English and Welsh towns with populations exceeding 50,000 persons at the last Census 6599 births and 7863 deaths were registered during the week ended Saturday, Dec. 23rd, 1916. The annual rate of mortality, which had steadily increased from 13·0 to 20·3 per 1000 in the five preceding weeks, further rose in the week under notice to 23·7 per 1000 of their aggregate civil population estimated at 17,312,295 persons for the year 1915. During the first 12 weeks of the quarter just ended the mean annual death-rate in these towns averaged 15·1, against a corresponding rate of 15·6 per 1000 in London. Among the several towns the death-rate during the week ranged from 9·4 in Lincoln, 12·4 in Barnsley, 13·5 in Ilford, 14·3 in Rhondda, and 14·4 in Smethwick, to 33·0 in Oxford, 34·8 in Southport, 35·1 in Hastings, and 39·7 in Bournemouth.

The 7863 deaths from all causes were 1138 in excess of the number in the previous week, and included 236 which were referred to the principal epidemic diseases, against 226 and 230 in the two preceding weeks. Of these 236 deaths, 83 resulted from measles, 63 from infantile diarrhœal diseases, 53 from diphtheria, 19 from whooping-cough, 10 from scarlet fever, and 8 from enteric fever, but not one from small-pox. The annual death-rate from these diseases was equal to 0·7 per 1000, and corresponded to that recorded in each of the three preceding weeks. The deaths attributed to measles, which had been 47, 56, and 50 in the three preceding weeks, rose to 83, and included 31 in London, 8 in Coventry, 7 in Manchester, 6 each in Birmingham and Liverpool, 5 in Edmonton, and 3 in Warrington. The deaths of infants (under 2 years) from diarrhœa and enteritis, which had declined from 477 to 82 in the 14 preceding weeks, further fell to 63, of which 14 were registered in London, 7 in Manchester, 6 in Birmingham, and 3 each in Stoke-on-Trent, Liverpool, Leeds, and Rhondda. The fatal cases of diphtheria, which had been 50, 47, and 61 in the three preceding weeks, fell to 53, and included 11 in London, 5 in Stoke-on-Trent, and 4 each in Birmingham and Manchester. The deaths attributed to whooping-cough, which had been 16, 23, and 18 in the three preceding weeks, numbered 19, of which 4 occurred in London and 3 in Bristol. The deaths referred to scarlet fever, which had increased from 6 to 12 in the four preceding weeks, fell to 10, and included 2 each in London and Manchester. The 8 cases of enteric fever were slightly below the average in the earlier weeks of the quarter, and included 2 each in London and Nottingham.

The number of scarlet fever patients under treatment in the Metropolitan Asylums Hospitals and the London Fever Hospital, which had declined from 1171 to 1012 in the six preceding weeks, further fell to 922 on Saturday, Dec. 23rd; 100 new cases were admitted during the week, against 120, 103, and 100 in the three preceding weeks. The cases of diphtheria numbered 1445, against numbers declining from 1584 to 1473 in the four preceding weeks; 136 new cases were admitted during the week, against 171, 169, and 158 in the three preceding weeks. The 2028 deaths from all causes in London were 222 in excess of the number recorded in the previous week and corresponded to an annual death-rate of 24·5 per 1000. The deaths referred to diseases of the respiratory system, which had steadily increased from 132 to 524 in the nine preceding weeks, further rose to 650 in the week under notice. The deaths from influenza numbered 86, against 55 and 81 in the two preceding weeks.

Of the 7863 deaths from all causes in the 96 towns, 253 resulted from violence, 557 were the subject of coroners' inquests, and 2070 occurred in public institutions. The causes of 106, or 1·3 per cent., of the total deaths were not certified either by a registered medical practitioner or by a coroner after inquest. All the causes of death were duly certified in Leeds, Bristol, West Ham, Salford, and in 60 other smaller towns. Of the 106 uncertified causes, 20 were registered in Birmingham, 19 in Liverpool, 8 in Manchester, 5 each in South Shields and Gateshead, and 4 each in London, Barrow-in-Furness, and Stockton-on-Tees.

In the 96 English and Welsh towns 5629 births and 7260 deaths were registered during the week ended Saturday, Dec. 30th, 1916. The annual rate of mortality, which had increased from 13·0 to 23·7 per 1000 in the six preceding weeks, fell to 21·9 per 1000 in the week under notice. During the 13 weeks of last quarter, the mean annual death-rate in these towns averaged 15·6, against 16·1 per 1000 in London. During the week the death-rate ranged from 10·8 in Grimsby, 11·4 in Barnsley, 11·5 in Smethwick, 12·2 in Aberdare, and 15·5 in Ilford, to 29·6 in Reading, 31·0 in Norwich, 31·6 in Rotherham, 33·7 in Bath, and 35·3 in Warrington.

The 7260 deaths from all causes were 603 below the number in the previous week, and included 229 which were referred to the principal epidemic diseases, against 230 and 236 in the two preceding weeks. Of these 229 deaths, 80 resulted from infantile diarrhœal diseases, 66 from measles, 42 from diphtheria, 26 from whooping-cough, 8 from scarlet fever, and 7 from enteric fever. The annual death-rate from these diseases was equal to 0·7 per 1000, and coincided with that recorded in each of the four preceding weeks. The deaths of infants (under 2 years) from diarrhœa and enteritis, which had steadily declined from 477 to 63 in the 15 preceding weeks, rose to 80, and included 30 in London, 5 in Birmingham, 4 in Liverpool, and 3 each in Leicester and Manchester. The deaths attributed to measles, which had been 56, 50, and 83 in the three preceding weeks, fell to 66, of which 25 occurred in London, 8 in Coventry, 6 in Edmonton, and 4 each in Manchester and Sheffield. The fatal cases of diphtheria, which had been 47, 61, and 53 in the three preceding weeks, further fell to 42, and included 7 in London and 3 each in West Ham and Birmingham. The deaths attributed to whooping-cough, which had been 23, 18, and 19 in the three preceding weeks, rose to 26, but showed no great excess in any town. The deaths referred to scarlet fever, which had been 8, 12, and 10 in the three preceding weeks, fell to 8, and included 2 each in Liverpool and Salford. The 7 fatal cases of enteric fever, of which 2 were registered in Bury, were 2 below the average in the earlier weeks of the quarter.

The number of scarlet fever patients under treatment in the Metropolitan Asylums Hospitals and the London Fever Hospital, which had declined from 1171 to 922 in the seven preceding weeks, rose to 934 on Saturday, Dec. 30th; 86 new cases were admitted during the week, against 103, 100, and 100 in the three preceding weeks. The cases of diphtheria numbered 1485, against numbers declining from 1584 to 1445 in the five preceding weeks; the admissions during the week were 113, against 169, 158, and 136 in the three preceding weeks. These hospitals also contained on Saturday last 257 cases of measles, 48 of whooping-cough, and 37 of enteric fever. The 1932 deaths from all causes in London were 66 below the number in the previous week, and corresponded to an annual death-rate of 23·7 per 1000. The deaths referred to diseases of the respiratory system, which had steadily increased from 132 to 650 in the ten preceding weeks, fell to 645 in the week under notice. The deaths from influenza numbered 93, against 81 and 86 in the two preceding weeks.

Of the 7260 deaths from all causes in the 96 towns, 241 resulted from violence, 597 were the subject of coroners' inquests, and 1943 occurred in public institutions. The causes of 97, or 1·3 per cent., of the total deaths were not certified either by a registered medical practitioner or by a coroner after inquest. All the causes of death were duly certified in Leeds, Bristol, West Ham, Bradford, Hull, and in 61 other smaller towns. Of the 97 uncertified causes 19 were registered in Birmingham, 18 in Liverpool, 6 in Gateshead, 5 each in Warrington and Sheffield, and 4 each in Manchester and Barrow-in-Furness.

HEALTH OF SCOTCH TOWNS.

In the 16 largest Scotch towns with an aggregate population estimated at 2,372,000 persons at the middle of this year, 1015 births and 794 deaths were registered during the week ended Saturday, Dec. 16th, 1916. The annual rate of mortality, which had been 15·4, 13·8, and 16·4 per 1000 in the three preceding weeks, rose to 17·5 per 1000 in the week under notice. During the first 11 weeks of the quarter just ended the mean annual death-rate in these towns averaged 14·5, against a corresponding rate of 14·3 per 1000 in the large English towns. Among the several towns the death-rate during the week ranged from 10·7 in Hamilton, 12·7 in Kirkcaldy, and 14·0 in Ayr, to 20·5 in Dundee, 23·0 in Perth, and 24·8 in Leith.

The 794 deaths from all causes were 47 in excess of the number in the previous week and included 37 which were referred to the principal epidemic diseases, against numbers declining from 53 to 38 in the three preceding weeks. Of these 37 deaths, 11 resulted from measles, 10 from infantile diarrhœal diseases, 7 from whooping-cough, 5 from scarlet fever, 3 from diphtheria, and 1 from enteric fever, but not one small-pox. The annual death-rate from these diseases was equal to 0·8, against 0·7 per 1000 in the large English towns. The deaths attributed to measles, which had been 20, 16, and 12 in the three preceding weeks, numbered 11, of which 6 occurred in Dundee and 3 in Glasgow. The deaths of infants (under 2 years) from diarrhœa and enteritis, which had been 18, 10, and 14 in the three preceding weeks, fell to 10, and included 4 in Glasgow. The fatal cases of whooping-cough, which had been 1, 6, and 3 in the three preceding weeks, rose to 7, and comprised 2 each in Glasgow, Edinburgh, and Dundee, and 1 in Leith. The 5 deaths attributed to scarlet fever were slightly in excess of the average in the earlier weeks of the quarter, and included 2 each in Aberdeen and Clydebank. The deaths referred to diphtheria, which had been 9, 9, and 6 in the three preceding weeks, fell to 3, which were recorded in Glasgow, Aberdeen, and Kilmarnock respectively. The fatal case of enteric fever and one typhus were registered in Glasgow.

The deaths referred to diseases of the respiratory system, which had been 131, 118, and 155 in the three preceding weeks, rose to 191 in the week under notice, but were 17 below the number registered in the corresponding week of 1915. The deaths from violence numbered 34, against 26 in each of the two preceding weeks.

In the 16 Scotch towns 959 births and 892 deaths were registered during the week ended Saturday, Dec. 23rd. The annual rate of mortality, which had increased from 13·8 to 17·5 per 1000 in the three preceding weeks, further rose to 19·6 per 1000 in the week under notice. During the first 12 weeks of the quarter just ended the mean annual death-rate in these towns averaged 15·0, against 15·1 per 1000 in the large English towns. Among the several towns the death-rate during the week ranged from 10·7 in Falkirk, 12·4 in Motherwell, and 12·6 in Clydebank, to 24·0 in Coatbridge, 24·1 in Paisley, and 30·1 in Perth.

The 892 deaths from all causes were 98 above the number in the previous week, and included 46 which were referred to the principal epidemic diseases. These 46 deaths corresponded to an annual rate of 1·0 per 1000, and included 14 from measles, 12 from whooping-cough, 9 from infantile diarrhœal diseases, 6 from diphtheria, 4 from scarlet fever, and 1 from enteric fever. The deaths attributed to measles,

which had declined from 20 to 11 in the four preceding weeks, rose to 14, and comprised 9 in Dundee, 2 each in Glasgow and Edinburgh, and 1 in Leith. The deaths referred to whooping-cough, which had been 6, 3, and 7 in the three preceding weeks, rose to 12, of which 5 occurred in Glasgow. The fatal cases of infantile diarrhœa, which had been 10, 14, and 10 in the three preceding weeks numbered 9, and included 3 in Glasgow and 2 in Edinburgh. The deaths from diphtheria were slightly below the average in the earlier weeks of the quarter, and showed no excess in any town. Two of the 4 deaths attributed to scarlet fever and the fatal case of enteric fever were recorded in Glasgow.

The deaths referred to diseases of the respiratory system, which had been 118, 155, and 191 in the three preceding weeks, further rose to 227 in the week under notice, and were 72 in excess of the number registered in the corresponding week of 1915. The deaths from violence numbered 33, against 26 and 34 in the two preceding weeks.

HEALTH OF IRISH TOWNS.

In the registration area of Dublin 99 births and 195 deaths were registered during the week ended Saturday, Dec. 23rd, 1916. The deaths were equal to an annual rate of 25·6, against 24·5 and 19·6 per 1000 in London and Glasgow respectively, and included 25 of infants under 1 year and 69 of persons aged 65 years and upwards.

Nine deaths were referred to infantile diarrhœa, 2 to measles, and 1 to enteric fever. The causes of 5 deaths were uncertified and those of 2 others were the subject of coroners' inquests, while 76 of the total deaths occurred in public institutions.

During the same period 146 births and 173 deaths were registered in the city of Belfast. The death-rate was equal to 23·1, or 4·1 per 1000 above that in the previous week. The total deaths included 18 of infants under 1 year and 46 of persons aged 65 years and upwards. Three deaths were referred to measles, 2 to enteric fever, and 1 to scarlet fever. The causes of 3 deaths were uncertified and those of three others were the subject of coroners' inquests, while 51 of the total deaths occurred in public institutions.

THE SERVICES.

ROYAL NAVAL MEDICAL SERVICE.

THE following appointments have been notified:—Fleet-Surgeons: J. R. Muir to Wei-Hai-Wei Sick Quarters; J. S. Dudding to *Tiger*; and R. B. Scribner to *Pembroke*. Temporary Surgeons: W. H. Butcher to *Victory*; and M. O. Hunter to Haslar Hospital.

ROYAL ARMY MEDICAL CORPS.

Lieut.-Col. H. E. Winter is retained on the Active List, and to be supernumerary.

To be Lieutenant-Colonels: Major L. C. Parkes, R.A.M.C. (T.F.), Major A. Carless, R.A.M.C. (T.F.), and Major G. R. Philip, C.A.M.C.

Temp. Major G. B. Price to be temporary Lieutenant-Colonel.

To be temporary Majors: Temp. Lieut. J. L. Birley (whilst employed on special duty), Capt. G. P. Taylor, and Temp. Capt. W. Penberthy (whilst commanding troops on a hospital ship).

To be temporary Captains: C. D. Rilance, C.A.M.C., C. P. Bligh-Wall, S.Afr.M.C., K. Bremer, S.Afr.M.C., S. Copley, S.Afr.M.C., J. C. Caldwell, S.Afr.M.C., Temp. Lieut. A. W. G. Murray, and Temp. Lieut. P. R. Lowe.

Temporary Captains relinquishing their commissions: J. D. Nicolas, W. J. G. Gayton, and S. Greenwood (on account of ill-health).

Temporary Lieutenants relinquishing their commissions: R. W. Halladay, H. C. Sutton, T. B. Shoolbread, J. J. MacRitchie, J. J. Hamelin, E. S. Bissell, A. B. Moffat V. E. Cartwright, A. B. Roberts, H. B. Stacpoole, G. W. Carleton, E. F. Nivin, R. Paterson, and C. R. M. Pattison.

SPECIAL RESERVE OF OFFICERS.

Lieut. S. W. Hoyland to be Captain.

To be Lieutenants: M. J. Burns, C. Weir, J. A. H. Miller, W. Corner, W. Yeoman (from University of London Contingent, Officers Training Corps), S. C. Swinburne (from Edinburgh University Contingent, Officers Training Corps), and B. Mountain.

Capt. P. C. MacRae relinquishes his commission on account of ill-health.

Second Lieut. A. G. D. Gavin, M.C., resigns his commission to resume medical studies.

TERRITORIAL FORCE.

Major C. R. White to be temporary Lieutenant-Colonel.

Major A. Carless is seconded whilst holding a temporary commission in the R.A.M.C.

Capt. E. W. Holyoak to be seconded.

General Hospitals: Capt. V. W. Low, C.B., is restored to the establishment.

Sanitary Companies: Lieut. N. Gebbie to be Captain.

Capt. (temp. Major) J. E. W. MacFall relinquishes his temporary rank on ceasing to command a Field Ambulance.

Capt. J. B. Sinson relinquishes his commission on account of ill-health.

Supernumerary for Service with the Officers Training Corps.—Lieut. (temp. Capt.) E. W. Walker to be Captain.

Attached to Units other than Medical Units.—Capt. R. Paterson relinquishes his commission on account of ill-health, and is granted permission to retain his rank and wear the prescribed uniform.

INDIAN MEDICAL SERVICE.

Surg.-Gen. Sir C. P. Lukis, K.C.S.I., Director-General, to rank as Lieutenant-General.

CENTENARIANS.—The *Times* states that on its front pages during 1916 the deaths of 321 persons who had reached the age of 90 and over were reported. Of these eight were over 100 (seven women and one man), the average age of the total number being a fraction over 93. The list includes 17 clerks in holy orders, and is 40 below the record of 1915.

Correspondence.

"Audi alteram partem."

THE NOMENCLATURE OF "INTERNAL SECRETION."

To the Editor of THE LANCET.

SIR,—It must long have been evident to all those interested in the subject that our nomenclature concerning what we describe as "internal secretion" is extremely unsatisfactory. Professor Sir E. A. Schäfer in his recent book, "The Endocrine Organs," discusses the question, but unfortunately he does not improve matters, for he adheres to the indefensible word "endocrine," and introduces several other unnecessary terms. The word "endocrine," which Professor Schäfer and many other authorities employ, is supposed to be derived from ἔνδον (within) and κρίνω (I separate)—the compounded word being taken to mean "internally separating" when used as an adjective. But surely it is not classical to combine an adverb with a verb in Greek. The only adjective that can be formed from this combination is "endocritic," and such words as "endocrinous" and "endocrine" are malformations. I think, also, that even "endocritic," which I have been in the habit of using myself, is a poor word, and that we can find a better one.

Professor Bayliss and Professor Starling in 1903 introduced the term "hormone," derived from ὁρμάω (I arouse); and they defined a hormone as a "chemical messenger." Professor Schäfer, however, objects to the word "hormone" being used indiscriminately for every internal secretion, for he considers that it implies an *exciting* agent only. His argument is that there are among the internal secretions not only exciting agents, which he would call "excitatory autocoids" (αὐτός=self, and ἄκος=a medicinal agent or remedy) or "hormones," but also "inhibitory autocoids" or "chalones" (χαλάω=I make slack), as he would designate them.

It appears to me that Professor Schäfer's limitation of the word "hormone" is not really valid. In the first place, Professor Bayliss and Professor Starling are entitled to define their own term; and they have done so, as I think, correctly, although metaphorically. In the second place, since it is admitted that the word "hormone" implies "a substance that arouses," surely it can be taken as meaning a "chemical messenger," which *provokes either activity or inhibition*. The important point is that, in picturesque language, the agent in question is a chemical messenger, and therefore the terms "autocoids" and "chalones" are superfluous, even though they may be entirely correct in their meaning and derivation. We have, then, a descriptive and well-established noun "hormone," but we still require a noun for the hormone-making process and an adjective to indicate the hormone-making organs; consequently, I would suggest that the words "hormopoiesis" and "hormopoietic" respectively be added to our scientific vocabulary. Their derivation is obvious and, I think, unassailable. Further, they are in direct sequence from the term "hormone" and their meaning is quite clear. It is possible that these words have occurred to others, but I have never come across them.

I am glad to be able to say that both Sir Clifford Allbutt and Professor Starling entirely approve of the terms which I beg to suggest for general adoption.

I am, Sir, yours faithfully,

Liverpool, Dec. 26th, 1916. W. BLAIR BELL.

THE PARLIAMENTARY REPRESENTATIVE OF DUBLIN UNIVERSITY.

To the Editor of THE LANCET.

SIR,—May we claim a small space in THE LANCET in order to urge upon its readers who are entitled to vote for a Parliamentary representative of Dublin University to record their votes at the forthcoming election for Sir Robert Woods, who is standing as a non-party candidate?

It would be idle for us to dwell upon the advantages that should accrue to the nation, and in particular to the medical

profession, by having in the House of Commons a distinguished scientific representative like Sir Robert Woods. It must be obvious to the medical graduates of Dublin University that the legal profession has had more than its share in the Parliamentary representation of the University, and a splendid opportunity is now offered whereby a change may be effected in this direction.

Owing, however, to the large number of medical graduates who are serving their king and country in the various theatres of the present war it will be extremely difficult to get into direct communication with many of the voters. We would, therefore, appeal to your readers, as this is a matter of urgency, to forward immediately to the appended address the addresses of any doctors of medicine of Dublin University who are known to them to be absent from their usual home addresses, so that proxies may be sent to such voters.

We are, Sir, yours faithfully,

A. FRANCIS DIXON, Professor of Anatomy;
JAMES CRAIG, King's Professor of Practice of Medicine;
Honorary Secretaries.

24, Trinity College, Dublin, Dec. 30th, 1916.

"SHELL SHOCK."

To the Editor of THE LANCET.

SIR,—It is interesting, and to me gratifying, to find that Captain E. Farquhar Buzzard has quite independently come to exactly the same conclusions as I expressed in my paper on the psychology of malingering and the functional neuroses published in your issue of Nov. 18th last. I hope those conclusions may now be generally recognised as indisputably correct.

"Shell shock" is a misleading and bungling term, covering several different disorders which were familiar before the war, viz.: (1) neurasthenia, due to lack of "ergogen" in the brain cells; (2) hysteria, or subconscious malingering following on emotional shock; (3) malingering of a purely conscious nature; and, lastly, (4) various combinations of the above.

It is, as Captain Buzzard points out, essential that such an analysis of "shell shock" cases should be made if they are to be satisfactorily treated, and it is well that the patients should recognise that they are not suffering from some new and wonderful disorder, but from common and curable diseases with which every physician has long been familiar. Appreciation of this fact will *per se* accelerate recovery. I am, Sir, yours faithfully,

South Eaton-place, S.W., Jan. 1st, 1917. THOMAS LUMSDEN.

LORD ROBERTS'S FIELD GLASSES: A RETROSPECT OF TWO YEARS' WORK.

To the Editor of THE LANCET.

SIR,—Soon after the outbreak of the war, my father, Lord Roberts, asked the public to lend their glasses for the use of the Army. After two years I think your readers may be glad to have some particulars of the result of his request.

Upwards of 26,000 glasses have been received, without reckoning those which, in pursuance of my father's suggestion, have been collected in Australia, the Malay States, and elsewhere, and issued forthwith to the local forces on their way to the seat of war. The instruments sent comprise every type, and have been classified and issued according to the needs of different units. Particularly useful have been the fine prismatic glasses sent which have been allocated to artillery and machine-gun units, according to their power; large mounted telescopes for batteries; deer-stalking telescopes for gunners and snipers, and good old-fashioned non-prismatic racing glasses for detection of the nationality of aircraft, locating snipers, signalling by disc, collecting wounded, and musketry instruction. I am indeed grateful for the way in which my father's appeal has been met. British people all over the world have given their best, recognising that, in spite of the fact that their glasses are on loan and that the organisation for their return has been arranged, the chances of loss are many, and that they may never get their glasses back.

When I think of the enormous numbers of good glasses sent it may seem ungracious to ask for more, but the demand is still great. I am told that at watering places, and on race-courses and elsewhere, large numbers of glasses are still to be seen in private hands, and to the owners of these I would once more appeal. I should add that we have been entrusted by the Ministry of Munitions with the purchase of individual glasses from those who cannot afford to lend them, and that the address for sending glasses for either purpose is the same. Every good glass (except opera-glasses) and every telescope (except toys) is wanted for the service of the country.

Glasses should be addressed to the Manager of Lady Roberts' Field Glass Fund, National Service League, 72, Victoria-street, S.W.

I am, Sir, yours faithfully,

December, 1916. ROBERTS.

THE RESULTS OF FEEDING MICE WITH MOUSE CANCER.

To the Editor of THE LANCET.

SIR,—We are gratified to see in the report of the meeting of the Section of Pathology of the Royal Society of Medicine in your issue of Dec. 16th, 1916, that Professor S. G. Shattock and Mr. L. S. Dudgeon, as the result of experiments on feeding mice with tumours, suggest virtually the same hypothesis as that we published in THE LANCET of March 4th, 1916, as a deduction from the results of injecting sarcoma filtrate or feeding on streptothrix isolated from rat sarcoma. We there put forward the suggestion that the parasite is very small and enters into the cell, possibly the nucleus, from which it is set free by the mincing process. The streptothrix appears to be a parasite present in tumours, and in one cycle of its growth it may be really ultramicroscopic, but at present this is unproved. Certainly we have not, so far, succeeded in obtaining a differential stain to demonstrate the parasite in the tissues, in spite of its comparatively easy cultivation from them. We experienced the same difficulty again recently in a case of streptotrichosis in a cow. The streptothrix isolated from the tissues proved fatal to a guinea-pig in three weeks and it was recovered by cultivation from the guinea-pig tissues, but it could not be shown in the sections or films prepared from the tissues of either the cow or the guinea-pig.

Of course, the successful production of tumours in mice, by feeding with malignant material, has been observed and recorded at least once before, by Ford Robertson, in 1909.

We are, Sir, yours faithfully,

A. S. LEYTON.
H. G. LEYTON.

University of Leeds, Dec. 28th, 1916.

SUPRARENAL HÆMORRHAGE IN CEREBRO-SPINAL FEVER.

To the Editor of THE LANCET.

SIR,—In THE LANCET of Dec. 23rd, 1916, Captain P. W. Maclagan and Captain W. E. Cooke describe some cases of cerebro-spinal fever characterised by rapid death and suprarenal hæmorrhage. I should like to point out that Karakaschaff in 1904 [1] described the case of a child who died from some other cause, and who had the medulla of both suprarenals calcified from old hæmorrhage. While in hospital there were no signs of suprarenal disease. I myself have seen a specimen from a child whose symptoms were typical of suprarenal hæmorrhage, yet here the damage was purely cortical. So also in Addison's disease. The rare cases of that condition which depend on "simple atrophy" show, if the atrophy has not gone too far, medulla surviving and cortex gone. It therefore appears, as I pointed out at the Pathological Society in January, 1914 [2], that suprarenal hæmorrhage and Addison's disease are fundamentally the same.

If I am asked why the blood pressure drops, I can only say that I do not know, but I can also ask if we are justified in assuming that loss of blood pressure always depends on loss of adrenalin.—I am, Sir, yours faithfully,

S. G. SCOTT,

Netley, Hants, Dec. 31st, 1916. Temporary Lieutenant, R.A.M.C.

[1] Ziegler's Beiträge, xxxvi., 401.
[2] Jour. of Path. and Bact., xviii., 419.

Obituary.

JAMES LITTLE, M.D. & HON. LL.D. EDIN., HON. M.D. DUB., &C.,

LAST PRESIDENT OF THE ROYAL COLLEGE OF PHYSICIANS OF IRELAND; REGIUS PROFESSOR OF PHYSIC IN THE UNIVERSITY OF DUBLIN; HONORARY PHYSICIAN TO HIS MAJESTY THE KING IN IRELAND.

THE death occurred on Dec. 23rd of James Little, Regius Professor of Physic in the University of Dublin, and one of the best known physicians in the United Kingdom. For some months past he had suffered from a failing heart, but he insisted on attending the recent session of the General Medical Council, of which he was a Crown nominee. On his return home he was carried to bed, and passed quietly away.

James Little was born at Newry in 1837. He was educated at Cookstown Academy and at the Royal School, Armagh, and was apprenticed to his profession at Armagh. Later he studied medicine at the medical schools of Trinity College, Dublin, and the Royal College of Surgeons in Ireland and attended the practice of the Richmond Hospital. In 1856 he became L.R.C.S. Irel., and shortly afterwards took a medical appointment at Calcutta. He remained in India for three years, and on his return continued his medical studies. In 1861 he graduated in medicine in Edinburgh, and began to practise in Lurgan, but soon migrated to Dublin. He was elected physician to the Adelaide Hospital as long ago as 1864, and with this institution the whole of his professional life was closely associated.

In 1867 he became a Fellow of the Royal College of Physicians of Ireland, and subsequently served as registrar and examiner, being elected President in 1887.

Little's professional progress on arrival in Dublin was remarkably rapid. In 1868 he became lecturer on medicine in the Ledwich School, and in 1872 he was elected professor of medicine in the Royal College of Surgeons in Ireland. He resigned this chair in 1883, by which time his private practice had become very great, though it was not until 1898 that the resignation by Sir John Banks of the Regius Professorship of Physic in the University of Dublin gave him his connexion with Trinity College, which lasted up to his death. For many years past he was one of the Crown nominees on the General Medical Council, and he was honorary physician to His Majesty the King in Ireland. He was a past-president of the Royal Academy of Medicine in Ireland, and of the Association of Physicians of Great Britain and Ireland. He was consulting physician to several Dublin hospitals—the Rotunda, Dr. Steevens', the Royal Victoria Eye and Ear, and of late years, since his resignation of the post of visiting physician, to the Adelaide Hospital.

In his earlier days he wrote occasional articles for the medical papers, and he was the author of two small books: "First Steps to Clinical Studies" and "Chronic Disease of the Heart." Of late years he wrote little. A man of great physical and mental vigour, Little was a remarkably hale man and youthful for his age until comparatively recently. In 1914 he lost his wife, and the bereavement grieved him sorely. Shortly afterwards the Dublin rising tried him further, for his house was in the thick of much of the fighting and was fired into repeatedly. The old man went out fearlessly to attend professional calls, but he knew that he did so at the risk of his life. Last summer his health broke down definitely; but he was determined to attend the winter meeting of the General Medical Council in London, from which he returned a dying man.

Our Dublin Correspondent writes:—

For more than a generation James Little occupied a unique position in Irish medicine. It was not only that he was the leading physician and the first consultant in Ireland, but his voice was regarded as representative, in a special sense, of the medical profession with us. He was our unofficial head. For many years he enjoyed by far the largest practice in the country, probably one of the largest in the kingdom. He won it early in life, and he held it, almost without competition, for many years. To some it seemed that he secured it too easily, but the view was held only by those who did not know him well enough to recognise the native ability and shrewdness of the man, his painstaking study of his patients, and his marvellous command of his own experience. His method was clinical rather than pathological. He reasoned with marvellous memory from patient to patient, and his judgment seemed to be intuitive when it was based really on close observation. He was fortunate in retaining his freshness and receptivity of mind to old age, and he made generous use of younger men who were conversant with the newer methods of diagnosis or treatment. No leader was ever more considerate or generous to his younger colleagues in the profession, and there are not a few men now well established in medical practice in Ireland who owe much of their success to Dr. Little's early encouragement.

WILLIAM CAYLEY, M.D. LOND., F.R.C.P. LOND.,

CONSULTING PHYSICIAN TO THE MIDDLESEX HOSPITAL, AND TO THE QUEEN'S HOSPITAL FOR CHILDREN, ETC.

BY the death of Dr. William Cayley, which took place on Dec. 17th after a brief illness, British medicine has lost one of its wisest exponents, whose exceptional gifts and sterling qualities were less widely known than they deserved to be. He died a few days after attaining the age of 80 at his house at Richmond, which he had occupied since his retirement from practice about 15 years ago. He retained to the last a keen interest in the hospitals to which he had been attached, and it was as the result of a chill contracted whilst attending a committee meeting at one of them that his fatal illness developed.

William Cayley was born at Stamford, Lincolnshire, on Dec 14th, 1836, being the fifth of six sons of the late Edward Cayley, a partner in the banking firm of Eaton, Cayley, and Co. of that town. The family traced its descent from Cornelius Cayley, fourth son of Sir William Cayley, of Brompton, Yorkshire, who was created a baronet by Charles II. in 1661. William Cayley survived all his brothers, two of whom obtained distinction—Sir Richard Cayley, Chief Justice of Ceylon, and Surgeon-General Harry Cayley, of the Indian Medical Service. He was educated at Shrewsbury, where he imbibed a love of the classics which he retained throughout his life. His medical education was received at King's College, London, whence he graduated at the University of London, and obtained the M D. in 1861. He then, as was not unusual amongst English and American graduates, proceeded to Vienna, where there existed opportunities for clinical and pathological research under professors of world-wide reputation such as Skoda and Rokitansky. He was chiefly attracted to the study of pathology, and his first medical appointment after settling in London was that of demonstrator of morbid anatomy at the Middlesex Hospital, where his fellow-student, Robert Liveing, had been engaged for the past year as demonstrator of anatomy in succession to W. H. Flower. At that time there were on the hospital staff three other men who had been trained at King's College. Charles Murchison was the senior assistant physician and J. W. Hulke and George Lawson the two assistant surgeons. It was not until 1870 that Cayley became assistant physician, but he continued to superintend the post-mortem examinations for some years by himself. In 1867 this duty was shared by the medical and surgical registrars, the first holders of which were Cayley and Henry Arnott. Their reports for the two years they held these offices were, we believe, the first of the kind issued by any London hospital. In 1869 Dr. John Murray was appointed medical registrar and Mr. (now Sir) Henry Morris surgical registrar. In the medical school Cayley, in 1866, became joint lecturer on pathological anatomy with Mr. Sibley, in succession to Dr. Burdon Sanderson, who was made lecturer on physiology, a subject hitherto taught in connexion with anatomy. For two or three years he had also assigned to him a class of histology, whilst continuing to teach pathological anatomy, having in the latter subject as colleagues Mr. Arnott and Dr. Murray in succession. In 1869 he succeeded Dr. Spencer Cobbold as curator of the museum.

The year 1870 brought many changes in the personnel of the Middlesex staff. Dr. Murchison, who was now full physician and lecturer on medicine, with an established reputation as a clinical teacher, accepted, together with Mr. Arnott (recently appointed assistant surgeon), an invitation to join the staff of St. Thomas's Hospital, whose new and palatial buildings on the south bank of the river had just been completed. In the same year Dr. Burdon Sanderson left to fill the chair of practical physiology at University College. Dr. Robert Liveing became senior

assistant physician, Dr. Greenhow succeeding to the physiciancy vacated by Dr. Murchison, and first Dr. Cayley and then Dr. Murray became assistant physicians. On the resignation, in 1876, of Dr. Liveing, who had become physician in 1872, Dr. Cayley was promoted to the full staff, becoming senior physician on the death of Dr. Greenhow in 1876. He resigned office in 1901, within a few months of attaining the age-limit, and was appointed by the governors consulting physician. In the medical school he continued to lecture on pathological anatomy until 1876, when he succeeded to the lectureship in medicine, which he undertook for nearly 25 years. He devoted much time and labour to the affairs of the school, the increasing prosperity and extension of which were very gratifying to him, and he seldom missed, even for some years after his retirement, attending the October gatherings and annual meeting of the club, where an opportunity was given for reunion of those who had received their training at the hospital.

Besides his appointments at the Middlesex Hospital, Dr. Cayley was for 20 years physician to the London Fever Hospital and for about 15 years to the North-Eastern (now the Queen's) Hospital for Children. In 1892 he was made consulting physician to each of these institutions. He was elected a Fellow of the Royal College of Physicians of London in 1872. He held at various periods the offices of examiner, councillor, and senior censor, and in 1880 was selected to deliver the Croonian lectures. He took for his subject the Pathology and Treatment of Typhoid Fever, upon which his experience as physician to the London Fever Hospital entitled him to speak with authority. Those privileged to attend these lectures could not fail to have been impressed by the depth of knowledge and the cogency of reasoning they revealed. They were delivered, or rather recited, without a note, with steady fluency—a truly remarkable effort of memory—for they were packed full of details, which were given in ordered sequence without a break. The first lecture on etiology adduced striking facts in opposition to the possible and not infrequent independent or *de novo* origin of the disease, which was held so staunchly by Dr. Murchison; in the second lecture the pathology was discussed, and the clinical course of the fever lucidly explained, as well as the degenerative lesions produced by the pyrexial state; all leading up to the thesis advanced with overwhelming force in the third lecture of the value of antipyretic treatment, especially by the use of cold baths, as originally advocated by Currie, then set aside and forgotten until revived by Brand of Stettin in his treatment of the fever-stricken soldiers who were taken prisoners in the war of 1870. When, after Dr. Murchison's death, Dr. Cayley was entrusted with the editing of the third edition of that great physician's *magnum opus*, "The Continued Fevers of Great Britain," he was careful not to interfere with the arguments therein so amply developed in favour of the "pythogenic" origin of typhoid, but was content with brief interpolated notes, which showed how readily the facts might bear another interpretation. The bacillus had not yet been discovered, and it was 20 years or more before the "carrier" doctrine shed light on the origin of many an obscure case; but Cayley felt sure of his ground and saw no reason to change it.

He wrote the articles on typhoid fever for Fowler's "Dictionary of Medicine" and Allchin's "Manual of Medicine," but otherwise did not contribute very freely to medical literature. The second number of the newly established *Middlesex Hospital Medical Journal* contains an interesting clinical lecture by him on Cirrhosis of the Liver, which may be taken as an example of his teaching and the bearing of pathological knowledge on clinical facts and treatment. When he was first appointed to the charge of the post-mortem room he joined the Pathological Society, as in those days every aspirant to the London world of medicine and surgery felt it incumbent to do. The society was then nearing the zenith of its fame, and its fortnightly meetings at the Royal Medical and Chirurgical Society's rooms in Berners-street were amongst the most interesting of such gatherings. Middlesex Hospital was fortunate in being within a stone's-throw of the meeting-place, and its members contributed many a specimen. Cayley was an active member, for, besides his own exhibits, he had many specimens referred to him for examination in which he made good use of his histological knowledge; and when the Morbid Growths Committee was founded he long retained a seat on it. In this society he filled in turn the offices of medical secretary, treasurer, and Vice-President. He was one of the original members of the Clinical Society, the foundation of which, in 1867, apparently emanated from members of the Middlesex staff. Of the 128 original members only 7 or 8 now survive, and the society is merged in the Royal Society of Medicine.

Cayley also belonged to the Royal Medical and Chirurgical Society, and several of the papers contributed by him to these societies illustrate the bent of his mind, in regard to the treatment of conditions beyond the power of medicine to do more than alleviate. He was well aware that resort to surgical intervention in such cases was often but a last resource, but having made up his mind as to the nature of the case and its hopelessness from the medical standpoint he had the courage and boldness to turn to the surgeon for aid. Thus to the Clinical Society he contributed papers on cases of (1) gangrene of lung treated by incision; (2) intestinal obstruction relieved by gastro-enterotomy; (3) hæmoptysis treated by induction of pneumothorax so as to collapse the lung; and (4) perforation of bowel in typhoid fever treated by washing out the peritoneal cavity and excising the perforation; and in the Transactions of the Royal Medical and Chirurgical Society will be found two papers by him: one of a case of gangrene of lung successfully treated by drainage, and the other of a case of thoracic aneurysm treated by the introduction of steel wire into the sac.

Cayley's quiet, reserved, and unassuming character, his unbounded kindness of heart, his freedom from envy or ambition, and the charitable disposition which never allowed him to utter a word of disparagement or criticism of others, even when, in the opinion of most men, such comment would seem to have been fully justified—these are some of the traits that endeared him to all who knew him. One of these writes to us as follows:—"His was, indeed, an exceptional nature, and one felt in his presence that he could thoroughly be relied on in any of the trials and emergencies of life." His love of botany and of the Alps led him year by year to spend his summer vacation with congenial companions tramping in Switzerland, or the Tyrol, or by the Italian lakes. He knew Switzerland by heart, and as a member of the Alpine Club he made many a hazardous ascent. Perhaps the worst thing he felt in growing old was that he was no longer equal to these expeditions. But he found solace in his books and his garden, where he cultivated the flowers that he loved the most, and when the call came to him he was prepared, nay even glad, to depart, for he had spent a long, happy, and contented life, and had placed all his great gifts at the service of humanity.

RICHARD BARWELL, F.R.C.S. ENG.,

CONSULTING SURGEON TO CHARING CROSS HOSPITAL.

BY the death of Mr. Richard Barwell in his native city of Norwich, at the mature age of 90, the Royal College of Surgeons of England has lost its senior Fellow and Charing Cross Hospital a consulting surgeon.

Richard Barwell was educated at St. Thomas's Hospital, becoming M.R.C.S. in 1848 and Fellow in 1852. Thus he had outlived all his contemporaries and most even of his junior colleagues. He was appointed lecturer on anatomy at the medical school of Charing Cross in 1868 and assistant surgeon in 1855, his seniors being Hancock, late President of the Royal College of Surgeons of England, and Canton. In 1872 he became full surgeon, and from that date until his retirement in 1888 he led an active and strenuous life. A list of his contributions to the Transactions of the societies is evidence of his activity in various directions. In 1863 he published a work on the "Cure of Club-foot without Cutting Tendons," and in 1868 his work on "Lateral Curvature of the Spine" appeared, which reached a fifth edition in 1895. In 1880 he wrote on "Aneurysm of the Thorax and at the Root of the Neck," and in 1881 he published a "Treatise on Diseases of the Joints."

A paper which he read before the Royal Medical and Chirurgical Society in 1881, on Experience in Specimens of the Ox Aorta Ligature, attracted considerable attention. In it he pointed out that certain cases of aortic aneurysm might be benefited by deligation of the right carotid and subclavian arteries, and insisted upon the advisability of leaving

the inner and middle coats of the arteries tied in continuity, intact. To this end he advocated the use of a ligature which would not cut those tissues, and claimed that the ligature cut from the aorta of an ox and dried fulfilled the requirements. A remarkable case of hypertrophy of the right side of the face in a boy aged 7 was described by him in the Pathological Society's Transactions, vol. xxxii. The specimen is now in the Charing Cross Museum showing great enlargement of the tissues, including the bones, a specimen which, in the opinion of Professor A. Keith, is unique.

Mr. Barwell quickly appreciated the immense value of Lister's treatment, but owing to lack of opportunity he never fully mastered all the details, which during his life of active surgery were largely subjects of experiment. He therefore failed to obtain the results which later surgeons with fuller experience now regard as assured.

Mr. James Cantlie writes: "Mr. Barwell was endowed with a painstaking and original mind and one well calculated to deal with the mechanical inabilities due to paralysis of groups of muscles, such as occurs in club-foot, and the profession is to-day indebted to many expedients introduced by him in these affections. His enthusiasm found him visiting cripples' homes, workhouse infirmaries, homes for incurables, &c., in pursuance of a study which in his day was seriously neglected, and upon which he succeeded in directing the attention of the profession generally." It was due to a suggestion by Mr. Cantlie that he should ligature an artery with an artery that he evolved the idea of the ox aorta ligature, and it was as a consequence of this that the catgut ligature was evolved. As an expert in orthopædic surgery Mr. Barwell took a high place. His lectures to students upon lateral curvature and its treatment were classics in their completeness, and showed an originality of thought and conception only equalled by the clever technical devices by which he brought his ideas into practice.

Among his many friends Mr. Barwell will be remembered as an enthusiastic fisherman and an ardent skater. He was one of the best-known figures at the skating club in the grounds of the Toxophilite Society in Regent's Park, and he maintained his devotion until late in life to these pastimes. Their pursuit contributed to his hale old age, for no one would imagine that his trim figure and almost boyish step and carriage belonged to a man approaching 90 years of age.

DEATH OF BRIGADE-SURGEON ALEXANDER CAMPBELL MCTAVISH.—Honorary Brigade-Surgeon A. C. McTavish, Army Medical Department (retired), died at his residence at Kingswear, Devon, on Dec. 2nd last. The deceased qualified L.R.C.S. Edin. in 1858, and shortly afterwards entered the Army Medical Department, being attached to the 60th Rifles. In 1860 he went to the Madras Presidency, and in 1863 was thanked by the Commander-in-Chief for his services in connexion with the cholera epidemic at Thayet-Myo. Later he was at Calcutta and in 1874 was attached to the 17th Lancers. He served for many years in India, being invalided home in 1880, when he retired from the service.

THE LATE MR. W. J. BEST.—William Jenner Best, whose death occurred rather suddenly at the age of 51, was the son of the late Dr. Palemon Best, J.P., of Louth, Lincolnshire. He was educated at Rugby and Cambridge, receiving his medical education at the London Hospital and University and King's College, London. For the past 27 years he practised at Louth, taking his father's practice when the latter retired some years ago. He was very popular among his numerous patients, as well as among his medical colleagues at Louth.

AN advanced course of lectures on infant care for nurses, midwives, voluntary health workers, mothers, &c., will be held, under the auspices of the National Association for the Prevention of Infant Mortality and for the Welfare of Infancy, from Jan. 8th to Feb. 15th, on Mondays, from 3 to 4 P.M., at 1, Wimpole-street (corner of Henrietta-street, Cavendish-square), and on Thursdays, from 3 to 4 P.M., at the St. Marylebone General Dispensary, 77, Welbeck-street, W. Among the lecturers announced are Mrs. Scharlieb, M.D., Dr. Amand Routh, Dr. Eric Pritchard, Mrs. Shepherd, M.B., Dr. F. Langmead, Lady Barrett, M.D., Dr. R. C. Jewesbury, Dr. H. C. Cameron, Dr. John D. Rolleston, Dr. David Forsyth, and Dr. J. Lawson Dick.

The War.

THE CASUALTY LIST.

THE following names of medical officers appear among the casualties announced since our last issue:—

Killed.

Major P. A. Lloyd-Jones, D.S.O., R.A.M.C., was educated at Cambridge and at St. Bartholomew's Hospital, London, and graduated in 1904. He shortly afterwards joined the R.A.M.C., being gazetted major in July, 1915, and held a staff appointment as Deputy Assistant Director of Medical Services. He received the Order of the Crown of Italy for rescue work during the Messina earthquake, and had seen service in the South African War.

Wounded.

Capt. M. H. Barton, R.A.M.C., attached Leicester Regiment.
Lieut. T. G. H. Drake, R.A.M.C.
Capt. V. N. Rich, R.A.M.C., attached Dorset Regiment.

THE HONOURS LIST.

The following awards to medical officers are announced:—

K.C.B.

Surg.-Gen. H. R. Whitehead, C.B.

C.B.

Col. (temp. Surg.-Gen.) J. M. Irwin, late R.A.M.C.; Col R. L. R. Macleod, A.M.S.; Col. G. Cree, C.M.G., A.M.S.: Col. A. R. Sutton, D.S.O., A.M.S.; Col. G. H. Barefoot, C.M.G., R.A.M.C.; Temp. Col. T. Sinclair, A.M.S.; Lieut.-Col. E. T. F. Birrell, C.M.G., R.A.M.C.; Col. H. S. Birkett, Canadian A.M.C.; Col. J. A. Roberts, Canadian A.M.C.

K.C.M.G.

Surg.-Gen. R. W. Ford, C.B., D.S.O.; Col. M. P. C. Holt, C.B., D.S.O., A.M.S.

C.M.G.

Col. T. Daly, R.A.M.C.; Col. W. L. Gray, R.A.M.C.; Col. F. R. Newland, A.M.S.; Col. H. T. Knaggs, A.M.S.; Col. H. I. Pocock, R.A.M.C.; Col. B. H. Scott, R.A.M.C.; Col. R. W. Wright, R.A.M.C.; Col. T. Du B. Whaite, R.A.M.C.; Col. F. J. Morgan, A.M.S.; Temp. Col. T. C. English, A.M.S.; Lieut.-Col. A. R. Aldridge, C.S.I., Res. of Off., R.A.M.C.; Lieut.-Col. (temp. Col.) J. D. Ferguson, D.S.O., R.A.M.C.; Lieut.-Col. S. H. Withers, R.A.M.C.; Lieut.-Col. (temp. Col.; F. R. Buswell, R.A.M.C.; Lieut.-Col. L. F. Smith, R.A.M.C.; Lieut.-Col. (temp. Col.) F. A. Symons, D.S.O., R.A.M.C.; Temp. Lieut.-Col. G. M. Holmes, R.A.M.C.; Temp. Lieut.-Col. H. L. Eason, R.A.M.C.; Lieut.-Col. A. Sutton, Australian A.M.S.; Lieut.-Col. E. C. Hart, Canadian A.M.C.

Brevet-Colonel.

Lieut.-Col. H. H. Norman, R.A.M.C.

Brevet-Lieutenant-Colonels.

Maj. G. Ormrod, R.A.M.C.; Maj. (temp. Lieut-Col.) E. Ryan, D.S.O., R.A.M.C.

Distinguished Service Order.

R.A.M.C.—Capt. R. G. Archibald, empld. Egypt. Army; Capt. F. R. Armitage.

Lieut.-Col. M. H. Babington; Capt. (temp. Maj.) W. K. Beaman; Capt. F. A. Bearn, M.C., Spec. Res.; Maj. (temp. Lieut.-Col.) W. Bennett; Lieut.-Col. W. A. Benson; Capt. (temp. Maj.) R. E. Bickerton; Maj. (temp. Lieut.-Col.) E. B. Bird; Maj. R. B. Black, Res. of Off.; Lieut.-Col. (temp. Col.) R. J. Blackham, C.I.E.; Lieut.-Col. (temp. Col.) E. W. Bliss; Maj. (temp. Lieut.-Col.) J. H. Brunskill; Maj. (temp. Lieut.-Col.) R. A. Bryden.

Capt. H. M. Calder; Lieut.-Col. F. F. Carroll; Lieut.-Col. R. W. Clements; Lieut.-Col. H. Collinson; Maj. J. H. M. Conway; Capt. M. Coplans.

Maj. (temp. Lieut.-Col.) H. A. Davidson; Capt. D. Dickie; Capt. (temp. Maj.) G. H. Dive; Lieut.-Col. (temp. Col.) H. M. Dunn.

Capt. (temp. Maj.) G. B. Edwards; Lieut.-Col. O. W. A. Elsner; Maj. H. H. A. Emerson.

Maj. and Bt.-Lieut.-Col. (temp. Lieut.-Col.) F. G. Fitzgerald.

Maj. (temp. Lieut.-Col.) W. R. P. Goodwin.

Maj. W. Haig; Maj. (temp. Lieut.-Col.) T. E. Harty; Maj. (temp. Lieut.-Col.) W. J. S. Harvey; Lieut.-Col. F. Hawthorn; Lieut.-Col. H. Hewetson; Lieut.-Col. H. C. R. Hime; Maj. (temp. Lieut.-Col.) A. E. Hodder; Maj. (temp. Lieut.-Col.) C. W. Holden; Capt. F. D. G. Howell; Lieut.-Col. W. E. Hudleston; Maj. (temp. Lieut.-Col.) D. O. Hyde.

Maj. O. Ievers; Lieut.-Col. E. T. Inkson, V.C.

Maj. J. T. Johnson.

Maj. (temp. Lieut.-Col.) H. B. Kelly.

Lieut.-Col. J. W. Langstaff; Temp. Maj. (temp. Lieut.-Col.) C. E. Ligertwood.

Maj. (temp. Lieut.-Col.) E. McDonnell; Capt. (temp. Maj.) D. F. Mackenzie; Maj. (temp. Lieut.-Col.) J. Mackinnon; Lieut.-Col. C. W. Mainprise; Temp. Capt. J. D. Marshall; Maj. J. St. A. Maughan; Maj. C. R. Millar; Temp. Capt. R. M. Miller; Lieut.-Col. E. M. Morphew.

Maj. S. L. Pallant; Temp. Capt. W. N. Parker; Capt. (temp. Maj.) T. H. Peyton; Lieut.-Col. (temp. Col.) C. E. Pollock; Lieut.-Col. (temp. Col.) H. V. Prynne; Capt. (temp. Maj.) W. B. Purdon, M.C.; Maj. L. M. Purser.

Lieut.-Col. W. Ransom; Maj. (temp. Lieut.-Col.) M. B. Ray; Maj. (temp. Lieut.-Col.) T. F. Ritchie; Lieut.-Col. H. S. Roch; Maj. (temp. Lieut.-Col.) A. M. Rose.

Temp. Capt. E. Scott; Lieut.-Col. (temp. Col.) D. D. Shanahan; Lieut.-Col. (temp. Col.) J. P. Silver; Maj. J. O. Summerhayes.

Lieut.-Col. A. G. Thompson; Maj. C. G. Thomson; Maj. L. V. Thurston.

Lieut.-Col. A. A. W. Watson; Lieut.-Col. (temp. Col.) B. Watts; Capt. (temp. Lieut.-Col.) G. T. Willan, H. C. Fd. Amb.; Maj. (temp. Lieut.-Col.) M. G. Winder; Maj. (temp. Lieut.-Col.) B. F. Wingate; Maj. R. N. Woodley; Capt. (temp. Maj.) W. G. Wright.

Temp. Capt. W. A. Young.

A.M.S.—Lieut.-Col. (temp. Col.) C. W. Profeit; Lieut. (temp. Col.) P. W. Sargent.

R.N. Division.—Staff-Surg. C. E. C. Stanford, R.N.

Australian A.M.C.—Lieut.-Col. G. W. Barber; Maj. J. E. Dods, M.C.; Maj. H. K. Fry; Lieut.-Col. (temp. Col.) C. H. W. Hardy, V.D.; Maj. A. H. Marks; Lieut.-Col. J. H. Phipps; Lieut.-Col. T. G. Ross; Lieut.-Col. C. G. Shaw; Lieut.-Col. J. B. St. V. Welch.

Canadian A.M.C.—Temp. Col. A. E. Snell; Lieut.-Col. W. Webster; Lieut.-Col. R. P. Wright.

New Zealand M.C.—Lieut.-Col. D. W. W. Murray.

South African M.C.—Temp. Maj. M. S. Power.

Military Cross.

R.A.M.C.—Temp. Capt. W. Ainslie.

Temp. Capt. D. Bell; Temp. Capt. F. G. Bell; Temp. Capt. J. F. Bourke; Temp. Capt. H. Boyers; Capt. R. Burgess; Temp. Capt. G. B. Burwell.

Capt. F. S. Carson; Capt. C. Cassidy, empld. Egypt. Army; Temporary Capt. A. B. Cheves; Capt. A. G. Clark, Spec. Res.; Capt. T. C. Clarke; Capt. H. G. Crawford, Spec. Res.; Temp. Capt. D. E. Crosbie; Capt. A. G. Cummins, empld. Egypt. Army.

Temp. Capt. W. E. David; Capt. D. Davidson; Capt. D. Dougal, Spec. Res.; Capt. T. I. Dun, Spec. Res.; Temp. Capt. J. L. Dunlop.

Capt. C. D. Edwards; Temp. Capt. E. Evans.

Capt. T. G. Fleming, Spec. Res.; Temp. Capt. C. Y. Ford; Temp. Capt. D. T. Fraser; Capt. J. Fraser, Spec. Res.; Temp. Capt. A. Fullerton.

Capt. W. G. Galwey; Capt. J. G. Gill.

Temp. Capt. D. H. Hadden; Capt. G. H. Haines, Spec. Res.; Temp. Capt. H. P. Hamilton; Temp. Capt. G. F. Hardy; Capt. W. T. Hare, Spec. Res.; Capt. W. C. Hartgill, Spec. Res.

Capt. R. L. Impey, Spec. Res.

Capt. G. G. Johnstone.

Capt. T. J. Kelly, Spec. Res.; Temp. Capt. M. B. King.

Capt. G. Q. Lannane; Temp. Lieut. J. W. Littlejohn; Temp. Capt. A. L. Lockwood; Capt. W. E. C. Lunn.

Temp. Capt. E. L. Mackenzie; Temp. Capt. W. Macleod; Temp. Capt. A. Malseed; Temp. Capt. J. C. Matthews; Temp. Capt. G. R. D. McGeagh; Temp. Capt. A. F. Menzies; Temp. Capt. K. E. Millan; Temp. Capt. F. J. Morris; Capt. G. T. Mullally, Spec. Res.

Capt. F. J. S. Ney.

Temp. Lieut. W. L. Partridge; Temp. Lieut. M. G. Pettigrew.

Temp. Capt. A. B. Raffle; Temp. Capt. A. Richmond.

Capt. G. Scott; Capt. J. A. C. Scott; Capt. F. R. S. Shaw, Spec. Res.; Temp. Capt. G. M. Shaw; Capt. H. D. Smart; Capt. W. M. Snodgrass, Spec. Res.; Temp. Capt. W. N. Soden; Capt. L. B. Stott; Temp. Lieut. D. C. Suttie.

Capt. G. P. Taylor; Temp. Capt. F. R. Thornton.

Temp. Capt. B. W. Wibberley; Temp. Capt. D. L. Williams; Capt. M. J. Williamson; Temp. Capt. I. S. Wilson; Capt. J. H. Wood.

Temp. Capt. J. M. Young.

Australian A.M.C.—Capt. J. Bentley; Capt. J. B. Birch; Capt. A. E. Colvin; Capt. E. M. Fisher; Capt. J. T. Jones; Capt. C. B. Metcalfe.

Canadian A.M.C.—Capt. A. A. Drinnan; Capt. F. W. Lees; Capt. R. M. Luton; Capt. J. E. McAskill; Capt. W. F. Nicholson; Capt. (acting Maj.) P. Poisson; Capt. W. D. S. Rorison.

Egyptian A.M.C.—El Yuzbashi (Capt.) Musa Khouri Zakharia (Effendi); El Yuzbashi (Capt.) Nasralla El Burgi (Effendi).

New Zealand A.M.C.—Hon. Capt. G. Sandham.

Also the following in connexion with the Battle of Jutland:—

Distinguished Service Order.

Fleet-Surg. Ernest Alfred Penfold, R.N.

Was in the fore medical distributing station when a heavy shell burst just outside, killing and wounding many. He was knocked down, bruised, and shaken, but personally assisted in the removal of the wounded and tended them with unremitting skill and devotion for 40 hours without rest. His example was invaluable in keeping up the morale of the wounded and of the medical party under very trying conditions, the shell having destroyed instruments, dressings, &c.

And the following in connexion with the Tanganyika Flotilla:—

Distinguished Service Cross.

Surg. Hother McCormack Hanschell, R.N.

The comparative immunity from sickness enjoyed by the members of the expedition was due to the unremitting care bestowed by Surgeon Hanschell on the health of the personnel and on the sanitary state of the camps and vessels.

In the Indian list of New Year's honours for war services the following awards are recorded:—

C.B.—Inspector-General J. C. B. Maclean, R.N. (retired).

C.I.E.—Lieut.-Col. J. G. Hojel, I.M.S.; Dr. M. Y. Young, medical officer at the Oil-fields, Persian Gulf.

MENTIONED IN DESPATCHES.

The name of Fleet-Surgeon Alfred James Hewitt, R.N., is mentioned, and he is noted for accelerated promotion, "in recognition of the conspicuous gallantry and very exceptional professional ability which he displayed as medical officer of H.M.S. *Pegasus* when that ship was sunk by the *Königsberg* in September, 1914."

THE SOMME CAMPAIGN.

In a thrilling despatch from General (now Field-Marshal) Sir Douglas Haig, G.C.B., Commander-in-Chief of the British Forces in France, describing the several phases of the Somme campaign, tribute is paid to the valuable work of the medical services—

The losses entailed by the constant fighting threw a specially heavy strain on the Medical Services. This has been met with the greatest zeal and efficiency. The gallantry and devotion with which officers and men of the regimental medical service and field ambulances have discharged their duties is shown by the large number of the R.A.M.C. and Medical Corps of the Dominions who have fallen in the field. The work of the Medical Services behind the front has been no less arduous. The untiring professional zeal and marked ability of the surgical specialists and consulting surgeons, combined with the skill and devotion of the medical and nursing staffs, both at the casualty clearing stations in the field and the stationary and general hospitals at the base, have been beyond praise. In this respect also the Director-General has on many occasions expressed to me the immense help the British Red Cross Society have been to him in assisting the R.A.M.C. in their work.

The health of the troops has been most satisfactory, and during the period to which this despatch refers there has been an almost complete absence of wastage due to disease of a preventable nature.

A long list of names of officers and men deserving of special mention accompanies this despatch, and the names of the medical officers included will be given in THE LANCET.

OBITUARY OF THE WAR.

ALBERT GROENWALD, M.C.,

CAPTAIN, SOUTH AFRICAN MEDICAL CORPS.

Captain A. Groenwald, of the South African Medical Corps, died at the Johannesburg General Hospital on Nov. 11th last, after having been invalided back to the Transvaal from German East Africa, where his distinguished services won him the Military Cross. The funeral took place with military honours on Nov. 13th, and among those present were Mrs. Louis Botha, and Captain Brebner representing General Botha. The South African Railways and Harbours Corps provided the firing party, and the pall-bearers were Captains of the South African Medical Corps.

CHARLES HUMPHRY GOW, B.A. CAMB., M.R.C.S. ENG.,

TEMPORARY SURGEON, ROYAL NAVAL DIVISION.

Surgeon C. H. Gow, who was killed in action on Nov. 13th last at the age at 25, was the only son of the Rev. Henry Gow, of Rosslyn Hill Chapel, London, N.W., and nephew of Dr. W. J. Gow. Educated at Wyggeston School,

Leicester, Westminster School, and Emmanuel College, Cambridge, he was completing his medical study at St. Bartholomew's Hospital when war broke out and he enlisted as a surgeon-probationer, serving for nine months on a destroyer. He then returned home to complete his medical qualification, after which he at once became surgeon in the Naval Division, serving at Gallipoli, Salonica, and France. Surgeon Gow's commanding officer wrote of him as an upright, honest, and fearless man. During his short life he gave evidence of qualities which would have carried him far.

DEATHS AMONG THE SONS OF MEDICAL MEN.

The following sons of medical men must be added to our lists of those who have fallen during the war:—

G. D. Massy, London Regiment, elder son of the late Lieutenant-Colonel G. Massy, I.M.S., retired.
Second Lieut. B. Hincks, King's Royal Rifle Corps, youngest son of Dr. T. S. H. Hincks, of Hay, Hereford.
Private F. A. Hobart, Argyll and Sutherland Highlanders, youngest son of the late Dr. N. J. Hobart, of Cork.
Second Lieut. R. L. L. Caunter, Gloucester Regiment, younger son of Dr. R. L. Caunter, of Brewood, Staffs.
Second Lieut. N. M. H. Atkinson, only surviving son of Dr. T. R. Atkinson, of Chadwell Heath, Essex.
Corporal F. Rendall, The Buffs, second son of Dr. W. Rendall, late of Maiden Newton, Dorset.

We are pleased to learn from Dr. Harry P. Major that Lieut. Cyril B. Major is officially reported as "Missing" only, and not as having fallen, as recorded in THE LANCET of Dec. 23rd, 1916. It is presumed that he has been taken prisoner.

CANADIAN ARMY MEDICAL SERVICE.

The official report of the Special Board of Inquiry appointed to investigate the charges brought against the Canadian Army Medical Service has been published, and by it the Service has been cleared in a most welcome manner of accusations which originated from official sources and had therefore to be seriously considered. Last summer the Canadian Minister of Militia, Sir Sam Hughes, appointed Colonel H. A. Bruce Special Inspector-General of the Canadian Army Medical Service, with the duty to report on the medical work of the Canadian Expeditionary Force. Colonel Bruce and a small committee thereupon drew up a drastic indictment of the Canadian Army Medical Service, recommending complete reorganisation of the Service, and attributing considerable blame to the Director of the Service, Surgeon-General Carleton Jones. The report of Colonel Bruce's Committee proposed the concentration of Canadian sick and wounded in Canadian hospitals, and suggested that the British V.A.D. were unsuitable for the care and treatment of Canadian soldiers. Surgeon-General Carleton Jones replied to the indictment of Colonel Bruce's Committee, but Sir Sam Hughes delivered an inaccurate and mischievous address at Toronto in which he adopted, apparently, the opinions of Colonel Bruce and his co-workers. This speech caused the most poignant grief and anxiety in Canada, as it conveyed the impression that the Canadian wounded were badly treated in British hospitals.

Sir Sam Hughes having resigned his office at the request of the Canadian Premier, he was succeeded by Sir George Perley, who at once instituted a strong Special Board of Inquiry into the findings of Colonel Bruce's Committee, with Surgeon-General Sir William Babtie as president. The new Board, in a report dated Dec. 21st, while accepting some of the recommendations made by Colonel Bruce's Committee upon the work and constitution of Medical Boards, is on greater matters at absolute variance with that Committee. The Board entirely disagrees with the suggestion that the Canadian Army Medical Service should be dissociated from the British service and that Canadian sick and wounded should be concentrated in Canadian hospitals. The Board finds that the V.A.D. hospitals are well run and well cared for, and that the criticisms of these institutions as inefficient and expensive were incorrect and unjust. The work of Surgeon-General Carleton Jones and that of his staff is praised by the Special Board of Inquiry, the Director of the Canadian Army Medical Service being especially commended for hard work, tact, and zeal.

Sir William Babtie's Board, in preparing its report, has not only taken into account the evidence submitted to it, but has incorporated into some of its recommendations its own knowledge of conditions so far as they affect the efficiency of the Canadian Army Medical Service. The report is thus rendered additionally valuable, as in this way the reasons are forthcoming for the dissent of the Board from the findings of Colonel Bruce's Committee, and its strong support of the Director of the Service. The report shows that, while special hospital establishments were provided for Canadian sick and wounded soldiers up to February, 1916, the pooling of hospital service and administration was later made necessary by the conditions of the war, and the economy of the existing method is demonstrated by figures. The policy attributed by the Board to Colonel Bruce of a separate medical administration for Canadian soldiers "would have prevented the use of Canadian Medical Units in the Mediterranean, because Canadian troops did not happen to be employed in that theatre of the war, and the sending of Canadian hospitals to Paris for the use of the French sick and wounded." The fact that Canadian soldiers have arrived in England from Canada who are medically unfit is attributed by the Board to inexperience of recruiting matters in Canada, a situation which might have secured protest from the Director of the Medical Service.

Dr. Ernest W. White, emeritus professor of psychological medicine, King's College, London, has been appointed honorary consultant in mental diseases to the Western Command, with the temporary rank of Major, Royal Army Medical Corps.

Medical News.

UNIVERSITY OF LONDON.—**The Graham Legacy** Committee have elected Sir Seymour Sharkey, M.D., to be their chairman for the remainder of the year 1916–17.—The University Medal at the M.B., B.S. Examination for internal and external students, October, 1916, has been awarded to Graham Selby Wilson, of Charing Cross Hospital.—The Senate will proceed shortly to an appointment to the Gilchrist Studentship for Women, which is of the value of £100, tenable for one year by a graduate of the University who is prepared to take a course of study in an approved institution in preparation for some profession. Candidates must have graduated in honours in the University of London, and must be of not more than three years' standing from their first graduation.—The third ordinary general meeting of the University of London Club, Limited, was held at the Club House on Dec. 14th, 1916. Major A. M. H. Gray was elected a member of the committee.

At examinations held recently the following candidates were successful:—

SECOND EXAMINATION FOR MEDICAL DEGREES, PART I.

Abbas Yousef Amer, King's College; Marjorie Muriel Sibley Bartlett, London (Royal Free Hospital) School of Medicine for Women; Arthur Bearblock, University College; Dorothy Bellows and Hylda Catherine Briscoe London (Royal Free Hospital) School of Medicine for Women; Ella Marianne Britten, Rhodes University College, Grahamstown; Egbert Aubrey Lennox Crichlow, King's College; Alfred Henry Gerald Down, University College; Pinkus Joseph Freilich, King's College; Edward Gallop, St. Bartholomew's Hospital; Frank Heber and Donald Hunter, London Hospital; Margaret Gray Jones, London (Royal Free Hospital) School of Medicine for Women; Carol Pinson Lake, University College, Exeter; Mary Michael, London (Royal Free Hospital) School of Medicine for Women; James Victor Alexander Simpson, Middlesex Hospital; Dorothea Compston Wigfield, London (Royal Free Hospital) School of Medicine for Women (distinction); and David Hardy Williams, London Hospital.

M.D. EXAMINATION.

Branch IV., Midwifery and Diseases of Women.—Charles Frank Schuler, B.S., St. Thomas's Hospital.

Branch V., State Medicine.—Ethel Mary Minett, B.S., London (Royal Free Hospital) School of Medicine for Women; Laura Gertrude Powell, B.S., University College, Cardiff, and London (Royal Free Hospital) School of Medicine for Women; and Robert Heywood Wilshaw, B.S., Victoria University of Manchester and University College and Guy's Hospitals.

M.S. EXAMINATION.

Branch I., Surgery.—Charles Jennings Marshall, M.D., Charing Cross Hospital (University Medal).

UNIVERSITY OF CAMBRIDGE.—**At examinations** for Medical and Surgical degrees held during Michaelmas term, 1916, the following candidates were successful:—

FIRST EXAMINATION (October, 1916).

Part I., Chemistry.—I. R. Paterson, King's; C. V. Patrick, Caius; C. M. Pollock, Trinity; J. H. Porter, Downing; W. Shaw, St. John's; H. Spibey, Downing; and T. M. Thomas, Caius.
Part II., Physics.—J. B. H. Gough, Corpus Christi; I. R. Paterson, King's; C. V. Patrick, Caius; C. M. Pollock, Trinity; W. Shaw, St. John's; H. Spibey, Downing; and T. M. Thomas, Caius.

Part III., Elementary Biology.—I. R. Paterson, King's; C. V. Patrick Caius; and W. Shaw, St. John's.

FIRST EXAMINATION (December, 1916).

Part I., Chemistry.—S. J. Astbury, Sidney Sussex; G. J. V. Crosby, Christ's; A. Grant, Trinity; K. T. Liang, Caius; L. R. W. Price, Sidney Sussex; A. E. Slater, B.A., Christ's; and F. B. Sudbury, Caius. Women: J. R. Batten, Newnham; and D. A. D. Cropper, Girton.

Part II., Physics.—S. J. Astbury, Sidney Sussex; A. Grant, Trinity; J. H. Jones, non-Collegiate; K. T. Liang, Caius; J. H. Porter, Downing; L. R. W. Price, Sidney Sussex; F. B. Sudbury, Caius; E. R. C. Walker, Emmanuel. Women: J. R. Batten, Newnham; and D. A. D. Cropper, Girton.

Part III., Elementary Biology.—K. T. Liang, Caius; J. H. Porter and F. Skelton, Downing; A. E. Slater, B.A., Christ's; H. Spibey, Downing; and F. B. Sudbury, Caius. Women: J. R. Batten, Newnham.

SECOND EXAMINATION (October, 1916).

Part II., Pharmacology and General Pathology.—W. E. H. Banks, Clare; F. J. Bennett, B.A., Peterhouse; C. B. Clarke, Catharine; R. W. M. Dendy, B.A., Trinity; H. B. Dodwell, B.A., Emmanuel; C. Dunscombe, Downing; H. V. Edwards, Trinity; L. E. Frazer, Caius; L. P. Garrod, King's; A. D. Haydon, B.A., Caius; N. S. Hewitt, B.A., and F. R. G. Hief, B.A., Sidney Sussex; R. Hilton, Corpus Christi; H. G. G. Jeffreys, B.A., Trinity; T. A. Jones, Emmanuel; C. F. McLean, King's; E. Miller, B.A., St. John's; W. H. Palmer, Sidney Sussex; J. L. Potts, Caius; P. W. Putnam, B.A., Emmanuel; F. G. Spear, Christ's; B. W. Thompson, B.A., King's; Y.-S. Wan, St. John's; and F. G. Wood, B.A., Jesus.

SECOND EXAMINATION (December, 1916).

Part I., Human Anatomy and Physiology.—G. F. Abercrombie, Caius; S. T. Barrett, B.A., St. John's; F. L. Bonar, Caius; W. Breakell, Sidney Sussex; P. J. Briggs, B.A., Christ's; W. R. Carling and F. C. Cozens, Emmanuel; A. de Souza, B.A., Downing; V. N. Fenton, Queens'; S. G. Galstaun, B.A., Trinity; F. B. Hobbs, Sidney Sussex; G. W. Karunaratna, Clare; P. B. Kittel, Emmanuel; G. S. Need, B.A., St. John's; J. A. P. Shaw, Trinity; J. V. Sparks, St. John's; S. D. Sturton, Emmanuel; E. Tagoe, Christ's; and H. B. Yates, Downing.

THIRD EXAMINATION (December, 1916).

Part I., Surgery and Midwifery.—D. J. Batterham, B.A., Caius; D. C. Beaumont, B.A., Christ's; A. D. Haydon, B.A., Caius; B. B. Jareja, Trinity; G. M. Kendall, B.A., St. John's; G. L. Maule, B.A., Christ's; V. C. Pennell, M.A., Pembroke; D. W. R. Richardson, B.A., Caius; and F. A. Williamson, B.A., Queens'.

Part II., Medicine, Pathology and Pharmacology.—C. H. Crawshaw, B.A., Christ's; H. W. Featherstone, B.A., Trinity; A. D. Haydon, B.A., Caius; H. G. G. Jefferys, B.A., Trinity; G. M. Kendall, B.A., St. John's; C. F. Mayne, B.A., Caius; A. Orr-Ewing, B.A., Pembroke; A. A. Prichard, M.A., Clare; and T. S. Tirard, Trinity.

PUBLIC HEALTH IN BELFAST.—Our Belfast Correspondent writes: In 1916 there was a reduction of nearly 50 per cent. in the number of cases of scarlet fever notified in the previous year. On the other hand, while in 1915 only 49 cases of typhoid fever were notified, in 1916 the number rose to 123, a large proportion of the cases being in the Ballymacarrett district. Nothing has yet been done for maternal and child-welfare, but it is said a scheme is now prepared for the approval of the Local Government Board of Ireland.

DONATIONS AND BEQUESTS.—By the will of the late Miss Schaw the Glasgow Royal Infirmary has received £100,000. Other Glasgow medical institutions will receive a share of the £500,000 left by the testatrix.—The Clayton Hospital and Dispensary will receive £1000 under the will of the late Major W. H. Charlesworth, of Wakefield.—The Middlesex Hospital Cancer Ward for Women and the New Hospital for Women, Euston-road, will very considerably benefit under the will of the late Mr. Mudford, formerly editor of the *Standard*.—The late Mr. Henry Jones, of Branksome Park, Bournemouth, left by will £1000 to the Hospital for Incurables, Putney.—Colonel Thomas Edgar Jobling, of Bebside, Northumberland, has bequeathed £2000 each to the Royal Infirmary, Newcastle-on-Tyne, and the Fleming Memorial Hospital, Newcastle-on-Tyne; £1000 each to the Hospital for Incurables, Newcastle-on-Tyne, the Royal Victoria Asylum for the Blind, Newcastle, the Northern Counties Asylum for the Deaf and Dumb, the Home for Destitute Crippled Children, Gosforth.

UNIVERSITY OF MALTA: CONFERMENT OF HONORARY DEGREES.—On Dec. 16th, 1916, in the Aula Magna of the University of Malta, the degree of Doctor of Medicine, *honoris causa*, was conferred upon Colonel C. A. Ballance, C.B., M.V.O., A.M.S.; Colonel W. Thorburn, C.B., A.M.S.; Colonel A. E. Garrod, C.M.G., A.M.S.; and Colonel H. H. Tooth, C.M.G., A.M.S. This was the first conferment of honorary degrees under the provisions of a new statute, and as the Rector of the University, the Hon. Professor E. Magro, pointed out, it was the highest honour that the University was able to give. In describing the claims to such recognition of the new graduates of the University of Malta, Lord Methuen, the Governor of the Island, referred also to the services of Colonel G. L. Gulland, Colonel Charters Symonds, and Colonel Purves Stewart during their stay in Malta, and to the work of Colonel A. E. Barker, who, to the deep regret of all, gave his life for his country in Salonika. Sir Alfred Keogh, Director-General of the Army Medical Service, said his Excellency, bestowed an inestimable boon on Malta when he sent such able members of the medical profession to assist in the hospital work of the island.

THE CERTIFICATION OF SENILE PERSONS AS INSANE: A SCOTCH CONFERENCE.—In his last annual report Dr. C. J. Shaw, medical superintendent of the Royal Asylum, Montrose, deprecated the certification as insane and the transference to asylums of old people in whom mental symptoms were but the result of physical weakness and restlessness was only a terminal symptom. With adequate nursing and observation at night these old people could safely remain at home. A conference of representatives of parish councils recently took place at Montrose to discuss this question and a committee was appointed to deal with it.

Appointments.

Successful applicants for vacancies, Secretaries of Public Institutions, and others possessing information suitable for this column, are invited to forward to THE LANCET Office, directed to the Sub-Editor, not later than 9 o'clock on the Thursday morning of each week, such information for gratuitous publication.

ALCOCK, ARNOLD, M.D. Lond., has been appointed Honorary Surgeon to the Gloucestershire Royal Infirmary and Eye Institution.

BOWER, H. E., M.D., C.M. Edin., Medical Officer of Health to the Runcorn Rural District Council.

DUNDAS, GRACE H. G., L.R.C.P. & S. Edin., L.R.F.P.S. Glasg., F.R.C.S.I., Medical Officer under the Child-Welfare Scheme of the Leith Town Council.

JONES, E. LLOYD, M.D., B.C. Camb., Demonstrator of Medicine at Cambridge University.

Vacancies.

For further information regarding each vacancy reference should be made to the advertisement (see Index).

When the application of a Belgian medical man would be considered the advertisers are requested to communicate with the Editor.

BELFAST COUNTY BOROUGH MUNICIPAL SANATORIUM, Whiteabbey.—Temporary Resident Medical Superintendent. Salary at rate of £400 per annum, with board, &c.

BOLINGBROKE HOSPITAL, Wandsworth Common, S.W.—Resident Medical Officer and House Surgeon for six months. Salaries £200 and £150 per annum respectively, with board, &c.

BOLTON INFIRMARY AND DISPENSARY.—Female Second House Surgeon. Also Female Third House Surgeon. Salaries £200 and £180 per annum, respectively, with board, &c.

BOURNEMOUTH, ROYAL VICTORIA AND WEST HANTS HOSPITAL.—House Surgeon for six months. Salary £200 per annum, with board, &c.

BRISTOL GENERAL HOSPITAL.—House Surgeon for six months. Salary at rate of £175 per annum, with board, &c.

BRISTOL, BEAUFORT WAR HOSPITAL, Fishponds.—Resident Surgical Officer. Salary £365 per annum, with board, &c.

CARDIFF, KING EDWARD VII.'s HOSPITAL.—House Surgeon for six months.

CARDIFF, KING EDWARD VII. WELSH NATIONAL MEMORIAL ASSOCIATION.—Tuberculosis Physicians. Salary £500 per annum. Also Assistant Tuberculosis Physicians. Salary £350 per annum.

CARLISLE, CUMBERLAND INFIRMARY.—Resident House Physician. Salary £200 per annum; or fifth-year student, salary £100 per annum.

CHESTERFIELD AND NORTH DERBYSHIRE HOSPITAL.—Second House Surgeon. Salary £150 per annum, with board, &c.

CHILDREN'S INFIRMARY, Cleveland-street, London, W.—Female Assistant Medical Officer. Salary £250 per annum, with residential allowances.

GUILDFORD, ROYAL SURREY COUNTY HOSPITAL.—House Surgeon. Salary £200 per annum, with board, &c.

HOSPITAL FOR CONSUMPTION AND DISEASES OF THE CHEST, Brompton.—House Physician for six months. Salary 30 guineas.

HOSPITAL FOR SICK CHILDREN, Great Ormond-street, London, W.C.—House Surgeons, Assistant Casualty Medical Officer, and House Physician, unmarried. Salary at rate of £60 per annum each, with board, &c.

HUDDERSFIELD COUNTY BOROUGH EDUCATION AUTHORITY.—Assistant School Medical Officer. Salary £350 per annum.

INVERNESS, NORTHERN INFIRMARY.—House Surgeon or Locum Tenens. Salary as arranged, with board, &c.

MANCHESTER COUNTY ASYLUM, Prestwich.—Locum Tenens. Salary £7 7s. per week, with board, &c.

NORTHAMPTON GENERAL HOSPITAL.—House Surgeon. Salary £150 per annum, with board, &c.

NOTTINGHAM AND MIDLAND EYE INFIRMARY.—Female House Surgeon.

PADDINGTON GREEN CHILDREN'S HOSPITAL, London, W.—Clinical Assistant in Out-patients' Department.

QUEEN'S HOSPITAL FOR CHILDREN, Hackney-road, Bethnal Green, E.—House Physician and House Surgeon for six months. Salary £100 per annum, with board, &c.

QUEEN MARY'S HOSPITAL FOR THE EAST-END, Stratford.—House Surgeon.

ROYAL FREE HOSPITAL, Gray's Inn-road, W.C.—Female Surgical Registrar.

ROYAL NATIONAL ORTHOPÆDIC HOSPITAL, 234, Great Portland-street, W.—Resident Surgical Officer.

ST. GEORGE'S HOSPITAL, Hyde Park Corner, S.W.—Surgical Registrar. Salary £200 per annum.

SCOTTISH WOMEN'S HOSPITALS, 2, St. Andrew-square, Edinburgh.—Assistant Medical Officers for Serbian Unit in Russia. Also Assistant Surgeon for Serbian Unit in Macedonia. Salary at rate of £200 per annum, with board, &c.

SHEFFIELD ROYAL HOSPITAL.—Assistant House Surgeon, unmarried. Salary £120 per annum, with board, &c.

SOUTH LONDON HOSPITAL FOR WOMEN, 103, South Side, Clapham Common, S.W.—Female House Physician for six months. Salary at rate of £100 per annum, with board, &c.

VENTNOR, ISLE OF WIGHT, ROYAL NATIONAL HOSPITAL FOR CONSUMPTION AND DISEASES OF THE CHEST ON THE SEPARATE PRINCIPLE.—Assistant Resident Medical Officer.
VICTORIA HOSPITAL FOR CHILDREN, Tite-street, Chelsea, S.W.—Honorary Dental Surgeon.
WELSH METROPOLITAN WAR HOSPITAL, Whitchurch, near Cardiff.—Resident Medical Officer.
WESTMORLAND SANATORIUM, Meathop, Grange-over-Sands.—Second Assistant Medical Officer. Salary £200 to £250 per annum, with board, &c.

THE Chief Inspector of Factories, Home Office, London, S.W., gives notice of vacancies for Certifying Surgeons under the Factory and Workshop Acts at Esher, Surrey; Lydbrook, Glos; and Hull, Yorks.

Births, Marriages, and Deaths.

BIRTHS.

ATKINSON.—On Dec. 24th, at Hoefield House, Carlisle-avenue, Plymouth, the wife of Surgeon C. H. Fairbank Atkinson, R.N.V.R., of a daughter.
BIGGS.—On Dec. 1st, at York House, Blenkarne-road, Wandsworth Common, the wife of Major George Nixon Biggs, R.A.M.C.T., of a son.
INGOLDBY.—On Dec. 16th, at Lahore, India, the wife of Captain C. M. Ingoldby, R.A.M.C., of a son.
JONES.—On Dec. 30th, at Hillview, Grove Park, Kent, the wife of Captain Sydney H. Jones, R.A.M.C., of a daughter.
LAPAGE.—On Dec. 9th, at 194, Wilmslow-road, Withington, Manchester, the wife of C. P. Lapage, M.D., Captain, R.A.M.C., T. (*à la suite*), of a son.
MACMANUS.—On Dec. 31st, at The Cottage, Granville Park, Blackheath, the wife of Captain Desmond MacManus, R.A.M.C., of a son.
PEACOCK.—At the Epsom Nursing Home, on Dec. 27th, the wife of W. Baly Peacock, M.R.C.S. Eng., L.R.C.P. Lond., of Bracklesham, Epsom, of a daughter (Joan Elizabeth).
ROOKE.—On Dec. 24th, at Knole-road, Bournemouth, the wife of A. Basil Rooke, F.R.C.S., of a son.

MARRIAGES.

ABRAHAM—CACKETT.—On Dec. 21st, at the Parish Church, Crowhurst, Sussex, Everard Cecil Abraham, Captain R.A.M.C., to Dorothy Tressé Cackett, daughter of the late Edward and Bessie Cackett, of Canterbury.
GORDON—POWER.—On Dec. 27th, in London, Hon. Lieutenant-Colonel Mervyn Henry Gordon, M.D., R.A.M.C., to Mildred Olive, daughter of the late Sir William Power, K.C.B., F.R.S.
HARWOOD—PAIN.—On Dec. 31st, at St. Matthew's, Newington, Captain L. A. Harwood, R.A.M.C., to Lily Fanny, eldest daughter of Dr. and Mrs. Pain, New Kent-road.
SCOTT—BURNS.—On Dec. 30th, 1916, very quietly, at S. Mary's, Finchley, Eric Arnold Scott, temporary Captain, R.A.M.C., only son of Albert G. Scott, Glenroy, Seymour-road, Finchley, to Margaret Jessie Burns (Madge), daughter of the late J. B. Burns, of Rugeley.

DEATHS.

BARWELL.—On Dec. 27th, at Norwich, Richard Barwell, F.R.C.S., Consulting Surgeon to Charing Cross Hospital, aged 90 years.
ORANGE.—On Dec. 31st, at Marina-court, Bexhill, William Orange, C.B., M.D., formerly Superintendent of Broadmoor Asylum, aged 83.
SALTER.—On Dec. 21st, at Higher Summerlands, Exeter, John Reynolds Salter, M.R.C.S., L.S.A., in his 91st year.
SHILLITOE.—On Dec. 23rd, at Ardvernia, 3, Richmond-gardens, Bournemouth, Buxton Shillitoe, F.R.C.S., late of 2, Frederick's-place, Old Jewry, E.C., in his 91st year.
SMITH.—On Dec. 21st, at Dover House, Southsea, Henry Robert Smith, L.R.C.P. & S., aged 74 years.
SUTHERLAND.—On Dec. 23rd, at 33, Trafford-road, Salford, Manchester, Wm. Leith Ireland Sutherland, M.B., C.M., aged 61.

N.B.—A fee of 5s. is charged for the insertion of Notices of Births, Marriages, and Deaths.

METEOROLOGICAL READINGS.

(Taken daily at 8.30 a.m. by Steward's Instruments.)

THE LANCET Office, Jan. 3rd, 1917.

Date.	Rain-fall.	Solar Radio in Vacuo.	Maximum Temp. Shade.	Min. Tem.	Wet Bulb.	Dry Bulb.	Remarks.
Dec. 28	...	53	53	31	34	34	Foggy
,, 29	0·27	57	55	34	53	53	Overcast
,, 30	0·17	69	53	49	48	49	Cloudy
,, 31	...	67	54	46	49	51	Overcast
Jan. 1	0·04	69	56	50	49	50	Overcast
,, 2	...	60	54	49	48	49	Fine
,, 3	...	65	54	49	51	52	Overcast

Other information which we have been accustomed to give in these "Readings" is withheld for the period of the war.

The following journals, magazines, &c., have been received:—American Medicine, Clinical Medicine, Medical Review of Reviews, Journal of the Missouri State Medical Association, Mercy and Truth, Medical Journal of South Africa, Archives of Internal Medicine, Indian Journal of Medical Research, Archives de Médecine et de Pharmacie Militaires, Prescriber, Dominion Medical Monthly, American Journal of Surgery, Medico-Legal Journal, Journal of Scottish Meteorological Society, Proctologist and Gastroenterologist, Journal of Nervous and Mental Diseases, Annali di Medicina Navale e Coloniale.

Notes, Short Comments, and Answers to Correspondents.

MILK IN THE DIET OF INFANTS.

To the Editor of THE LANCET.

SIR,—The letter of your correspondent "M.D., M.R.C.P." in THE LANCET of Dec. 30th, 1916, does not supply sufficient evidence to determine the method to be adopted of solving the problem he propounds. The phenomenon of milk causing retching may be due to one of two causes—an idiosyncrasy towards cow's milk or intense disgust. One instance of the former has come under my notice, though in a younger child. An infant, aged 7 months, was brought for advice on weaning, as any form of cow's milk—dried, peptonised, or merely dilute—gave rise to coryza, bronchitis, and an urticarial rash with digestive disturbance. This sequela to the taking of milk I personally verified, and the reaction to 3 ounces of milk was most striking.

Recollecting a case of idiosyncrasy to eggs published in your journal a few years ago, I adopted the line of treatment there used with success—that of producing toleration to minute quantities of the offending substance, and then gradually increasing the amount. Finding that a mixture of water, albulactin, and lactose caused no disturbance, a minute quantity of cream—5 minims to 3 ounces—was added and a feed of this was given once daily. As the slight disturbance caused gradually lessened the amount of cream was increased, and finally, after three months, the child was able to take a fair quantity of milk and weaning was accomplished.

I do not discuss what may have been the actual factor causing the intoxication or why this particular mixture was adopted at the outset of treatment. Disgust would seem to be the more probable cause in your correspondent's case. It is common for children to evince great repulsion towards certain foods, and if they are taken under compulsion retching and even vomiting may follow. Even more, I have met children who would announce that if a certain article of diet were forced upon them, they would be sick and they always carried out their threat. Frequently the hostility is only evinced towards one form of milk and may be overcome by presenting that food in other forms, as in soups, puddings, milk jelly, or flavoured with cocoa, for which purpose cocoa husks are useful, of which the devising will fall upon the ingenuity of mother and nurse.

It must be acknowledged that it is difficult to ensure a quart of milk being taken daily in these ways, and if it proves impossible the proteid and fat content of the diet must be increased by allowing additional eggs and butter or by the use of one of the proprietary preparations, such as virol, the intake of fluid being kept up to the requisite amount by giving water to drink in place of milk. The arrangement and regulation of such a diet can only be undertaken by one having a personal knowledge of the child and able to keep the progress of events under observation, for no child which presents such difficulty in feeding can be fed on a rule-of-thumb method.

I am, Sir, yours faithfully,

Upper Wimpole-street, W., Jan. 1st, 1917. DOUGLAS FIRTH.

"INDEX DOSURINE CASE."

THE Anglo-French Drug Company, Limited, of Gamage Building, Holborn, London, E.C., have brought to our notice the "Index Dosurine Case," which is a compact pocket outfit for the testing of urine for sugar and albumin. It contains a series of ampoules filled with a convenient quantity of the sugar and albumin reagents. A small pipette and two test-tubes are also provided. Some small pellets which prevent the liquid from bumping when being brought to the boil are included in the outfit. This set reduces the testing of the urine for sugar and albumin to a very simple matter and will be very useful for bedside work. An ordinary candle-flame is sufficient for heating the fluids.

PILEWORT.

To the Editor of THE LANCET.

SIR,—Can any of your readers kindly tell me something about the use of "pilewort"? Quite recently I have met persons suffering from hæmorrhoids who informed me that they had used to their great relief a certain secret ointment. I have purchased a pot of this ointment, which I have reason to believe has "pilewort" as an essential ingredient. On application the ointment causes a numbing astringent sensation, slightly discomforting at first but quickly passing away.

According to Stedman's Medical Dictionary, "Wort—(A.S. Wyrt) a suffix in the popular names of many plants such as liverwort, lungwort, woundwort, &c.;

also means an infusion of malt." The distinctive botanical characters of the "worts" and their uses are described in "Potter's Cyclopædia of Botanical Drugs and Preparations," second edition, by R. C. Wren, F.L.S., with additions by E. M. Holmes, F.L.S., but as I am only dealing specifically with "pilewort," I quote from this Cyclopædia: "Pilewort—Ranunculus Ficaria, Linn., N.O. Ranunculaceæ. Syn.,—Small Celandine, Lesser Celandine. Part used, herb. Action, astringent. As its name denotes, it is chiefly used for piles, for which it is almost a specific. Internally, the infusion of one ounce in a pint of boiling water is taken in wineglassful doses. Generally this is sufficient to cure most cases. Externally it can be used with advantage as an ointment applied locally night and morning." Then follows the distinctive botanical characters.

Now, Sir, it does appear to me that if these "worts" have any real medicinal properties, such as I believe the "pilewort" to have, why not add them to the Pharmacopœia, as many other remedies have from time to time been added to the "Book" containing the official list of medicines and compounds.—I am, Sir, yours faithfully,

FREDK. W. ALEXANDER,
Medical Officer of Health, Metropolitan Borough of Poplar.
Dec. 20th, 1916.

*** Pilewort ointment is still made, in part owing to the advocacy of Sir James Sawyer (*Birm. Med. Rev.*, May, 1901), though medicine has found the claims of the plant invalid. The botanical name is *Ranunculus ficaria*, but it was mentioned by John Gerard in his "Herball," published in 1597, as *Chelidonium minus*, or the "lesser celandine." Although it is a buttercup, and an entirely different plant from the greater celandine (the poppy order), the "lesser celandine" is the name that endures to-day, and Wordsworth under this name devoted a poem to the little flower. Culpeper in his "Herball" (about 1653) praises it, and within the last century it has been recommended in medicine in the following terms: "The leaves are antiscorbutic and the root reckoned a specific if beat into cataplasms and applied to the piles." But 50 years later we observe a change, as the editor of Lindley's works says: "Confident as are these assertions (those of Culpeper and others), yet the use of the plant is all but discontinued in the present day, medical practitioners properly looking for sounder principles than those derived from the doctrine of similitudes." The editor further states: "The trivial name of pilewort bestowed upon this plant from the structure of those tubercles (of the root) which show in small bundles of small tubers so like the shape of those excrescences which occur in the more distressing cases of piles that our forefathers who chose their medicines not from knowledge of the properties and qualities of plants, but from a kind of fancy as to Nature's external impress indicating the innate virtues, adopted it as a remedy for this malady." Pilewort flowers in early spring, and the roots form fasciculated knobs (hence the name *ficaria*, like figs).—ED. L.

THE QUESTION OF PROHIBITION.

To the Editor of THE LANCET.

SIR,—Fleet-Surgeon W. E. Home, in his letter in your issue of Dec. 23rd, 1916, advocates "closing all licensed houses till the war ends." How does he explain the hard fact that the heaviest beer-drinkers in Europe have, so far, proved themselves to be the brainiest and most successful fighters in this war? In our victorious wars of the past, naval or otherwise, the British drank beer as much as anyone. Prohibition theories do not seem to square with the teachings of military history. I am, Sir, yours faithfully,

H. N. ROBSON.
Junior Constitutional Club, Piccadilly, W., Dec. 29th, 1916.

A MEDICAL PHILOLOGIST.

MEMBERS of the medical profession who are Esperantists, or who are interested in the auxiliary language which is receiving increased attention at the present moment owing to its utility as an instrument of social, professional, and commercial intercourse, will read with pleasure an interesting sketch of Dr. Zamenhof which appears in the *Times* of Dec. 30th, 1916, in the Russian Section. Dr. Zamenhof, the inventor of Esperanto, was born at Bialystok in 1859, and though physically delicate, his intellect developed quickly, for he was able to read and write well at the age of four. Having qualified in medicine, he specialised in ophthalmology, studying for this purpose at Vienna, and ultimately taking up practice in Warsaw in 1886. In the following year he published his first text-book of an international language under the pseudonym of Dr. Esperanto, one who hopes, a name which subsequently became attached to the language itself. The language gradually began to spread in Russia, Germany, Sweden, Poland, and France, but did not take root in Britain till 1902. In 1905 an Esperanto Congress was held at Boulogne-sur-Mer, which was attended by delegates from all parts of the world, when the practicability of the language was clearly established. Other congresses have been held at Cambridge, Dresden, Barcelona, Washington, Antwerp, and Cracow, and in connexion with them Dr. Zamenhof has been made a Chevalier of the Legion of Honour, and received the Order of Isabella the Catholic, and many other distinctions. The author of Esperanto, who is now suffering from heart disease, devotes all his spare time to Esperanto, and has translated into that language many classics of the leading countries, as well as the whole of the Old Testament from the Hebrew original.

IRISH NURSES AND THE COLLEGE OF NURSING, LIMITED.

To the Editor of THE LANCET.

SIR,—In THE LANCET of Dec. 16th the secretary of the College of Nursing, Limited, intending to correct a statement made by me in your previous issue, states that "on reference to the Memorandum and Articles of Association it will be seen that membership of the College is strictly limited to nurses who possess a certificate of proficiency in *general* [italics in original] nursing (medical and general), and it is the members who govern the College." I have been unable to verify the secretary's statement. Paragraphs 3 (D) and 3 (E) of the Memorandum of Association deal with the granting of "certificates of proficiency in nursing" and of "certificates of training and proficiency in nursing," do not use the word "general," which is italicised by Miss Rundle, nor do they describe the nursing as "medical and surgical." Moreover, Paragraph 3 (I) makes it clear that the Council is not to be limited in its giving of certificates by the terms of the preceding paragraphs. The first paragraph of the Articles of the Association which deals with the definition of "members" of the College (No. 5) reads: "The subscribers hereto shall be members of the College." The subscribers are seven gentlemen, none of whom surely "possesses a certificate of proficiency in *general* nursing (medical and surgical)." The next paragraph of the Articles (No. 6) defines certain further qualifications for membership of the College other than being upon the Register.

If the secretary of the College of Nursing, Limited, can refer precisely to any paragraphs in the Memorandum or Articles which support the statements made in the letter to THE LANCET she will be doing a service to the College.

I am, Sir, yours faithfully,
Dec. 19th, 1916. ONE OF YOUR IRISH CORRESPONDENTS.

R. H. W.—An official communication on Trinitrotoluene Poisoning appeared in THE LANCET of Dec. 16th, 1916, and was the subject of a leading article in the same issue. The Physiological Effects of Nitroglycerine are dealt with briefly by Hale White ("Materia Medica," fifteenth edition, Churchill, 1916, p. 317), and Bruce and Dilling ("Materia Medica," tenth edition, Cassell, 1915, p. 299); and at greater length by Cushny ("Pharmacology," sixth edition, Churchill, 1915, p. 387).

COMMUNICATIONS not noticed in our present issue will receive attention in our next.

Medical Diary for the ensuing Week.

SOCIETIES.

SOCIETY FOR THE STUDY OF INEBRIETY, Rooms of the Medical Society of London, 11, Chandos-street, Cavendish-square, W.
TUESDAY.—3.30 P.M., Council Meeting. 4 P.M., Discussion on Alcoholism and Child Welfare in War Time (opened by Sir John Kirk, J.P.).

HUNTERIAN SOCIETY, at the Royal Society of Medicine, 1, Wimpole-street, W.
WEDNESDAY.—8.30 P.M., Council Meeting. 9 P.M., Hunterian Lecture:—Mr. J. W. T. Walker: The Bladder in Gunshot and other Injuries of the Spinal Cord.

WEST LONDON MEDICO-CHIRURGICAL SOCIETY, West London Hospital, Hammersmith-road, W.
FRIDAY.—8 P.M., Special Clinical Evening.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

POST-GRADUATE COLLEGE, West London Hospital, Hammersmith-road, W.
MONDAY.—2 P.M., Medical and Surgical Clinics. X Rays. Mr. Gray: Operations. Mr. B. Harman: Diseases of the Eye. Dr. Simson: Diseases of Women.
TUESDAY.—2 P.M., Medical and Surgical Clinics. X Rays. Mr. Baldwin: Operations. Dr. Banks Davis: Diseases of the Throat, Nose, and Ear. Dr. Pernet: Diseases of the Skin.
WEDNESDAY.—10 A.M., Dr. Saunders: Diseases of Children. Dr. Banks Davis: Operations of the Throat, Nose, and Ear. 2 P.M., Medical and Surgical Clinics. X Rays. Mr. Pardoe: Operations. Dr. Simson: Diseases of Women.
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SATURDAY.—10 A.M., Dr. Saunders: Diseases of Children. Dr. Banks Davis: Operations of the Throat, Nose, and Ear. Mr. B. Harman: Eye Operations. 2 P.M., Medical and Surgical Clinics. X Rays. Mr. Pardoe: Operations.

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TUESDAY.—2.30 P.M., Surgical Operations (Mr. Carson). Clinics:—Medical Out-patients (Dr. A. G. Auld); Surgical Out-patients (Mr. Howell Evans); Nose, Throat, and Ear Out-patients (Mr. C. H. Hayton). Radiography (Dr. Metcalfe). 3.30 P.M., Medical In-patients (Dr. A. J. Whiting).
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THURSDAY.—2.30 P.M., Gynæcological Operations (Dr. A. E. Giles). Clinics:—Medical Out-patients (Dr. A. J. Whiting); Surgical Out-patients (Mr. Carson); Radiography (Dr. Metcalfe). 3 P.M., Medical In-patients (Dr. R. M. Leslie).
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THE THROAT HOSPITAL, Golden-square, W.
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THURSDAY.—5.15 P.M., Clinical Lecture.

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TUESDAY.—4 P.M., Dr. J. L. Bunch: The Treatment of Nævi. 6 P.M., Dr. W. K. Sibley: Syphilis and its Treatment.
THURSDAY.—6 P.M., Chesterfield Lecture:—Dr. M. Dockrell: The Early Lesions of Syphilis and their Treatment.

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W.—Dr. G. U. Washburn, Peoria; Mr. C. J. Wilkinson, Windsor; Messrs. J. Wright and Sons, Bristol; Winsley Sanatorium, Bath, Sec. of; West Kent General Hospital, Maidstone, Sec. of; Mr. S. S. M. Wood, Lond.; Mr. O. Williams, Burry Port; Mr. C. P. Weeks, Lond.; Dr. A. M. Watts, Benares; Capt. M. Windross; Mr. G. Williams, Lond.; Mr. A. Wilson, Lond.; Dr. A. R. A. Wilhelm, Barkly East; Dr. S. I. Welsh, Lond.; Major A. E. Webb-Johnson, R.A.M.C.; Dr. H. Watt, Hawes; Mr. C. H. Whiteford, Plymouth; Capt. J. R. H. Ward, Leytonstone; Messrs. Willing, Lond.; Dr. F. J. Woollacott, Lond.; Staff-Surg. D. Wilkie, R.N.; Dr. J. F. Ward, Stockport; Mr. J. S. Whitty, Weston-super-Mare; W. A. Y.